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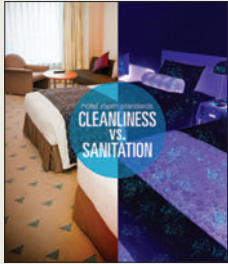
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ABOUT THE COVER



As shown on our cover, hotels often settle for cleanliness vs. sanitation, but our feature this month, “Sanitary Status and Incidence of Methicillin-Resistant

Staphylococcus aureus and *Clostridium difficile* Within Canadian Hotel Rooms,” highlights the dangers of that kind of approach. The authors sampled various surfaces from hotel rooms in three cities in Canada. Coliforms were recovered from 36% of surfaces, and oxacillin-resistant bacteria were recovered from 19% of surfaces with 46% of isolates confirmed as methicillin-resistant *Staphylococcus aureus*. The results of the authors’ study show that more emphasis is needed on sanitizing surfaces in hotel rooms rather than simple cleaning. See page 8.

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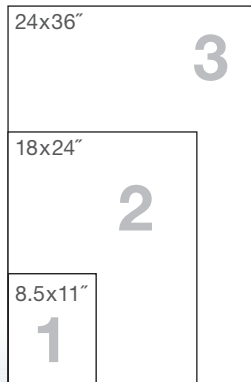


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▶ PRESIDENT'S MESSAGE



Carolyn Hester Harvey,
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NEHA Is a Volunteer Organization

Like most nongovernmental organizations, NEHA is a volunteer organization. As members we perform numerous functions for the organization as volunteers. Volunteers range from the board of directors (which includes the five elected officers and the nine regional vice presidents), to the affiliate presidents, technical advisors, peer reviewers and technical editors, past presidents, and numerous other committees and groups who perform various tasks or functions for NEHA. Many of us have been called upon to volunteer for some committee or work on some project, from developing the new Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) exam to deciding who our new executive director will be. As members we feel an obligation, and in most cases, a feeling of contribution to NEHA to ensure its continuation as the go-to organization for our profession.

All of us somehow found our way to NEHA; we believe we can contribute and encourage others to join and work with us to make NEHA the premier organization for environmental health. Many of us were elected by either the total membership, by our regional membership, by our state affiliate, or by being invited or asked by the president to be a technical advisor or to serve on some committee. Our members are volunteers in every sense of the word.

The board of directors has responsibilities that include financial and operational (as the executive director reports to the board). The board also is responsible for communicating with the membership. This year we have had

We feel an obligation, and in most cases, a feeling of contribution to NEHA to ensure its continuation as the go-to organization for our profession.

the enormous task of finding a new executive director, which takes time and financial resources. Our task is nearing completion and we know NEHA will have the very best executive director to lead us into the 21st century. One of the board's tasks related to this was a detailed review of NEHA and its operations. We found the NEHA staff to be a wonderful group of intelligent and hard-working individuals who perform their jobs, work with our members, interact with outside agencies, and maintain thousands of registrations in several areas of environmental health. Our job as board members is made easier by their dedication and loyalty to all of us who are members of NEHA.

Our affiliate presidents are the leaders on the ground and contribute so much to the

membership with their activities during the year including their annual meetings and their attendance at NEHA's Annual Educational Conference (AEC) & Exhibition to give us an update on what is happening in the trenches. They are the foundation upon which NEHA was created and the state organizations in which we are individual members. We hope many of them will move up to regional vice presidents or officers of NEHA in the future.

Perhaps the groups we see or converse with frequently at NEHA's AEC are the technical advisors. These volunteers are experts in their chosen field and give NEHA the ability to utilize their knowledge and expertise to assemble a slate of speakers for our AEC. They work with the NEHA staff to recruit speakers to present papers and posters and will moderate the educational sessions. Our educational sessions are some of the best presentations and posters with the latest information on a variety of subjects that are of vital interest to many members. After the AEC they will provide a written report to NEHA's educational coordinator that summarizes the presentations, handouts, audiovisuals, and speakers' technical and presentation skills.

Another group of volunteers that makes a big impact on NEHA are the *Journal's* peer reviewers and technical editors. Without this large group of individuals the *Journal* would not be able to publish the high-quality and scientifically sound articles that it does. All articles submitted to the *Journal* for publication consideration are sent to two peer reviewers and one technical editor for review. The peer reviewers provide feedback on the

article's originality, validity, sound scientific methods, logical discussion, and appropriate conclusions. The technical editors then use the peer reviewer feedback and their own expertise to determine if a manuscript is ready for publication, if revisions are necessary, or if the manuscript does not meet the *Journal's* high standards for publication.

NEHA's past presidents are a great resource for the president and current board members with their knowledge, expertise, and institutional memories. The past presidents committee has several functions, including selecting a person they believe has contributed to NEHA and served its members in an outstanding fashion by presenting them with the Past Presidents Award. It was a humbling experience to receive the Past Presidents Award in 2008. I was totally surprised and literally speechless. To me it is an award that

has special meaning since it is given by former presidents, who are the keepers of NEHA tradition. Many of them are retired but still have an involvement in NEHA. You are never too old to volunteer so give it some thought and volunteer.

The list of volunteers could go on and on. Besides the ones that I've mentioned above, NEHA relies on volunteers to be subject-matter experts within its credentialing department to assist in keeping our credentials relevant. Volunteers also make the workshops NEHA offers possible through the donation of their time and expertise as trainers. Volunteers also help out at NEHA AECs at the registration desk and other places to assist the staff in making the conference a success to all in attendance.

It's impossible to list all the volunteers, but each and every one should know how impor-

tant they are to NEHA. On behalf of NEHA I thank all the volunteers who make a positive impact on the association and who give their time and expertise freely. NEHA is truly indebted to all these individuals. Thank you! And if you want to get involved and volunteer some time to NEHA, please let us know!

In closing this column, I want to assure you we have a new executive director in the wings ready to come on board in early May. I believe you will find this individual to be an excellent choice to continue the work of NEHA for which many of you have contributed a good part of your working lives as active members. 🐼

Dr. Carolyn Harvey

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▶ INTERNATIONAL PERSPECTIVES



Sanitary Status and Incidence of Methicillin-Resistant *Staphylococcus aureus* and *Clostridium difficile* Within Canadian Hotel Rooms

Although most of the information presented in the Journal refers to situations within the United States, environmental health and protection know no boundaries. The Journal periodically runs International Perspectives to ensure that issues relevant to our international membership, representing over 25 countries worldwide, are addressed. Our goal is to raise diverse issues of interest to all our readers, irrespective of origin.

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Abstract The study described in this article aimed at establishing a baseline assessment of the sanitary status of ice and guest rooms within Canadian hotels. Collectively, 54 hotel rooms belonging to six different national chains were sampled. High-contact surfaces (comforter, alarm clock, bedside lamp, TV remote, bathroom countertop, faucet, and toilet seat) were sampled using adenosine triphosphate (ATP) swabs and replicate organism detection and counting plates. ATP swab readings ranged from 2.12 to 4.42 log relative light units. Coliforms were recovered from 36% of surfaces with high prevalence being recovered from the comforter, TV remote, bathroom countertop, faucet, and toilet seat. Oxacillin-resistant bacteria were recovered from 19% of surfaces with 46% of isolates confirmed as methicillin-resistant *Staphylococcus aureus*. Two toxigenic *Clostridium difficile* isolates were recovered in the course of the study. Collectively, 24% of the ice samples harbored coliforms with a single sample testing positive for *E. coli*. The authors' study demonstrates that hotel rooms represent a potential source of community-acquired infections and the need for enhanced sanitation practices.

Introduction

An increase in community-acquired infections has occurred within industrialized nations relating to a range of pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (Gastmeier, 2010). Health care-acquired infections remain the major source of infection with those receiving antibiotic therapy or the immune compromised being most susceptible (Gastmeier,

2010). In recent years, however, an increase has occurred in community-associated infections linked to both MRSA and *C. difficile* (Khanna et al., 2012). Community-associated MRSA and *C. difficile* infections are defined as those acquired by individuals who are not receiving antibiotic treatment or had recent contact with health care facilities (Khanna et al., 2012). Studies to date have identified environments outside health care settings

such as correctional facilities, student residences, nursing homes, and schools as potential sources of MRSA (Boa, Rahube, Fremaux, Levett, & Yost, 2013; Lee et al., 2013; Malcolm, 2011; Roberts, Soge, & No, 2013). A common feature of the aforementioned environments is high population densities coupled with sanitation issues (Malcolm, 2011). Another environment that could be a potential source of community-acquired infections is hotel rooms given that a high number of patrons pass through these establishments with the consequence of acquiring or transferring infectious agents. To date few studies have been devoted to assessing the sanitary status of hotels rooms. The studies that have been published focused on the potential spread of norovirus via hotel pools and restaurants (Guzman-Herrador, Heier, Osborg, Nguyen, & Vold, 2011). Little research has been pursued, however, about the contact surfaces within hotel rooms. Cheesbrough and co-authors (2000) reported a high prevalence of norovirus within hotel rooms with sequential guests acquiring the infectious virus in the absence of effective sanitation. Other reports have been published on the sanitary issues of hotel rooms although these were anecdotal in nature with no systematic studies being performed. Therefore, the objective of our study was to establish a baseline for the sanitary status and incidence of drug-resistant pathogens within Canadian hotel rooms.

TABLE 1

Classification, Room Tariff, and Customer Rating of Hotels Visited During the Study

Category	Location	Price (\$CAN)	Rating (#/100)
Budget A	Montreal	82	44
	Toronto	89	36
	Vancouver	90	46
Budget B	Montreal	78	21
	Toronto	110	69
	Vancouver	79	42
Mid-Range A	Montreal	150	55
	Toronto	139	79
	Vancouver	162	61
Mid-Range B	Montreal	135	66
	Toronto	129	55
	Vancouver	122	82
High-End A	Montreal	169	75
	Toronto	210	74
	Vancouver	200	73
High-End B	Montreal	219	74
	Toronto	249	62
	Vancouver	299	83

Note. Ratings from TripAdvisor (<http://www.tripadvisor.ca>, accessed May 2013).

Materials and Methods

Hotels belonging to six national chains in three cities (Toronto, Montreal, and Vancouver) were visited over the course of our study. The hotel chains were broadly grouped into budget, mid range, or high end based on the room tariff. Of interest was to establish if the perceived standard of the hotel reflected the sanitary status of rooms. The sanitary metrics used focused on adenosine triphosphate (ATP) swabs that are commonly used in assessing sanitation standards within the food and related industries (Turner, Daugherty, Altier, & Maurer, 2010). Replicate organism detection and counting (RODAC) plates were used to quantify the bacterial counts and contact plates were applied to highlight the potential presence of fecal indicators (Thigpen et al., 2009). In addition, the incidence of MRSA and *C. difficile* was determined given the significance of both pathogens in community-acquired infections.

Hotel Descriptions

Eighteen hotels were visited over the course of the study (June–September 2012) that were

located in Montreal, Toronto, and Vancouver (six hotels within each city). National chains were selected on the basis that sanitation management was assumed to be consistent in the different geographical regions. The hotels were visited on a single occasion within each city (Table 1). No notification of the sampling visit was given to hotels ensure that the sanitary status of the rooms was typical of the establishment. Three rooms located on different floors were sampled in each hotel along with up to three randomly selected ice machines.

Sampling of Hotel Rooms

The rooms were sampled upon entry with care taken not to handle or touch surfaces with bare hands. An initial visual assessment of the room was made that included a black light to highlight areas of fluorescent material. In each room, surface samples were taken of the bed cover (referred to as comforter), telephone touchpad, bedside lamp, bathroom faucet, bathroom countertop, and toilet seat. ATP luminometer testing was performed using a luminometer quick swab system. Contact plates (tryptic soy agar [TSA] containing

1% Tween or MacConky agar) were prepared using RODAC petri dishes (3 cm diameter). The RODAC plates were pressed onto the test surface then transferred to a chill box (4°C) before being incubated at 34°C (TSA plates) or 37°C (MacConky plates) (Schulze & Hildebrandt, 2007). Moistened swab samples were taken using sterile cotton wool swabs and directly plated onto a quadrant of an MRSASelect plate (Li, Zhao, & Xu, 2012). The inoculated plates were stored within a cold box then subsequently transferred to a 37°C incubator for 18 hours. Presumptive positive colonies (pink colonies) were sub-cultured onto oxacillin (6 mg/L) plates and incubated at 37°C for 24 hours. Confirmation of *S. aureus* was then performed by Gram-stain, catalase production, and Staphytest Plus agglutination test. Further samples were collected using premoistened sterile sponges. The sponges were suspended in 30 mL *C. difficile* moxalactam-norfloxacin (CDMN) broth containing 0.1% w/v sodium taurocholate and incubated anaerobically for 5–7 days at 37°C (Aspinall & Hutchinson, 1992). Aliquots (1 mL) of the enriched broth were mixed with an equal amount of anhydrous ethanol and incubated at room temperature (23°C) for one hour prior to centrifugation at 1,610 g for 10 minutes. The supernatant was decanted and the pellet was streaked onto CDMN agar plates using a sterile loop. The plates were then incubated anaerobically for 48 hours at 37°C with presumptive colonies being streaked onto blood agar plates that were subsequently incubated for 48 hours at 37°C. Confirmation of *C. difficile* was performed by screening for production of L-proline aminopeptidase. Ribotyping and toxinotyping were performed as described by Hawken and co-authors (2013).

Sampling Ice Machines

Ice was collected in a sterile pouch and allowed to defrost at room temperature prior to transferring to a 250-mL sterile bottle. The samples were transferred to a cold box and transported back to the laboratory. Volumes (100 mL) were passed through sterile cellulose acetate microporous filters (25 mm diameter, 0.45 µm pore size). The filter was transferred to a petri dish and placed on the surface of an absorbent pad saturated with m-ColiBlue24 broth (Mannapperuma, Abayasekara, Herath, Werellagama, & Heinonen-Tanski, 2011). The

plates were incubated at 37°C with blue colonies being counted as *E. coli* with other coliforms appearing red. In parallel, aliquots (0.1 mL) of melted ice water were plated onto standard plate count agar and incubated at 35°C for 48 hours to determine the heterotrophic plate count (HPC) (Bartram, Cotruvo, Exner, Fricker, & Glasmacher, 2004).

Data Analysis

In total, 54 hotel rooms located in Toronto, Montreal, or Vancouver were sampled between July and September 2012. Six hotels were visited in each city with three rooms being sampled per hotel. Results from ATP testing were transformed into log₁₀ values with statistical differences being identified using analysis of variance and Tukey’s test.

RODAC plates were deemed to be a failure if >50 CFU (total aerobic count [TAC]) were recorded per plate and/or presence of coliforms (Dell, 1979). Correlation coefficients were calculated for TAC vs. ATP readings using regression analysis. Ice quality was assessed based on standards used for potable water testing (i.e., negative for coliforms) (Mannapperuma et al., 2011).

Results

Visual Inspection

Although nonquantitative, visual inspection provides a general assessment of the cleanliness of the room being sampled. In general, it was observed that budget hotels had a lower level of cleanliness compared to the mid-range and high-end establishments. Major violations were observed in Budget A in Vancouver and Toronto in the form of soiled sheets that had not been changed after the previous guest had vacated. In Budget A in Montreal and High-End A in Toronto mold growth was visible on air conditioning units. Within the other rooms tested the levels of cleanliness were deemed acceptable despite the presence of dust and sporadic detection of fluorescent stains on contact surfaces.

The hotel ratings were taken from reviews submitted by guests. The budget hotels consistently scored lower than that of mid-range and high-range establishments (Table 1). The only exception was Budget B Toronto that achieved an overall score of 69/100. The mid-range and high-end hotels had comparable ratings that ranged from 55 to 83/100 (Table 1).

TABLE 2

Relative Light Units (RLU) Recorded for Adenosine Triphosphate Swabs Used to Sample Different Surfaces Within Hotel Rooms

Surface/Hotel	Log RLU		
	Median (Average)	Minimum	Maximum
Bedside lamp			
Budget A	2.59 (2.72) ^a	1.73	4.33
Budget B	2.32 (2.25) ^a	1.45	2.68
Mid-Range A	2.64 (2.29) ^a	2.35	4.17
Mid-Range B	2.23 (2.74) ^a	1.93	2.75
High-End A	2.47 (2.25) ^a	1.04	2.79
High-End B	2.22 (2.21) ^a	1.60	2.88
Alarm clock			
Budget A	2.51 (2.49) ^a	1.86	3.50
Budget B	2.41 (2.39) ^a	2.12	2.78
Mid-Range A	2.34 (2.28) ^a	2.00	2.63
Mid-Range B	2.38 (2.37) ^a	1.58	2.89
High-End A	2.33 (2.24) ^a	2.03	2.91
High-End B	2.20 (2.41) ^a	1.72	3.06
TV remote			
Budget A	2.40 (2.55) ^a	1.83	3.50
Budget B	2.31 (2.46) ^a	2.09	2.93
Mid-Range A	2.57 (2.64) ^a	2.09	3.34
Mid-Range B	2.64 (2.64) ^a	2.36	2.90
High-End A	2.88 (2.75) ^a	2.64	3.58
High-End B	2.81 (2.91) ^a	2.22	3.19
Telephone			
Budget A	2.91 (2.96) ^a	1.30	2.95
Budget B	2.69 (2.68) ^{ab}	2.49	2.97
Mid-Range A	2.57 (2.51) ^{ab}	2.01	3.44
Mid-Range B	2.52 (2.59) ^{ab}	2.00	3.24
High-End A	2.45 (2.45) ^{ab}	1.32	2.88
High-End B	2.38 (2.40) ^b	2.16	2.97

continued on page 11

ATP Luminometer

ATP readings were taken from the different surfaces within the hotels rooms with the collective data from each surface being pooled based on the hotel chain. A relatively high variation occurred in the ATP counts recorded both within and across hotels. It was not possible to use ATP readings to illustrate which of the surfaces carried the highest loading given the different surface areas sampled (i.e., 10 cm² vs. per unit). Yet, it is possible to compare the ATP readings of the same surface type between hotels. No significant difference occurred ($p > .05$) of the average relative light

units (RLU) recorded for bedside lamps, alarm clocks, TV remotes, bathroom counters, or toilet seats sampled across the different hotels (Table 2). Significant differences ($p < .05$) were recorded for the average RLU counts of comforters with those in budget hotels being significantly higher ($p < .05$) compared to those in mid-range hotels and one of the high-end hotels sampled (Table 2). Comforters sampled at High-End A, however, had ATP readings that were not significantly ($p > .05$) different from the budget hotels (Table 2). The RLU readings from the bathroom faucet exhibited a large variation except for Mid-Range Hotel

TABLE 2 continued from page 10

Relative Light Units (RLU) Recorded for Adenosine Triphosphate Swabs Used to Sample Different Surfaces Within Hotel Rooms

Surface/Hotel	Log RLU		
	Median (Average)	Minimum	Maximum
Comforter			
Budget A	3.31 (3.31) ^a	2.71	4.12
Budget B	3.20 (3.21) ^a	2.08	4.42
Mid-Range A	2.12 (2.51) ^b	1.88	3.10
Mid-Range B	2.51 (2.33) ^b	1.57	3.37
High-End A	3.17 (3.09) ^a	2.29	3.97
High-End B	2.18 (2.03) ^b	1.23	2.63
Bathroom faucet			
Budget A	3.05 (3.06) ^a	2.10	4.02
Budget B	2.16 (2.39) ^{ab}	1.91	3.26
Mid-Range A	2.28 (2.78) ^a	1.51	2.67
Mid-Range B	2.66 (2.37) ^b	2.04	4.08
High-End A	3.37 (2.24) ^a	2.11	3.85
High-End B	2.47 (2.41) ^a	1.48	3.95
Bathroom counter			
Budget A	2.15 (2.48) ^a	1.79	3.64
Budget B	2.31 (2.41) ^a	1.89	3.12
Mid-Range A	2.13 (2.60) ^a	1.84	2.70
Mid-Range B	2.52 (2.20) ^a	2.00	3.24
High-End A	2.05 (2.17) ^a	1.38	2.77
High-End B	2.12 (2.12) ^a	1.52	3.02
Toilet seat			
Budget A	2.22 (2.28) ^a	1.30	2.95
Budget B	2.31 (2.39) ^a	1.94	3.21
Mid-Range A	2.03 (2.45) ^a	1.38	3.20
Mid-Range B	2.40 (2.16) ^a	1.79	2.99
High-End A	2.00 (2.22) ^a	1.15	3.81
High-End B	2.17 (2.19) ^a	1.71	3.06

Note. Average RLU values within each surface type followed by the same letter are not significantly different.

A. Significant differences ($p < .05$) occurred among the RLU recorded for bathroom faucets in different hotels although this could not be attributed to the class (i.e., budget, mid range, or high end) of the establishment. The average ATP readings recovered from telephones sampled in the different hotels were comparable except for those sampled in Budget A, which were significantly higher RLU values ($p < .05$) compared to High-End B.

RODAC Plate Counts

The TAC and coliform counts were determined using RODAC plates. No significant

correlation ($p > .05$) was found between the recorded TAC and ATP readings taken from the different surfaces. The criteria to designate a failure was TAC of >50 CFU per plate and presence of coliforms. Based on the aforementioned criteria, it was found that the TAC and coliform counts of comforters from the budget hotels, in addition to the Mid-Range A, were among the highest failure items (Table 3). Coliforms, however, were recovered from comforters within all the hotels with a high percentage fail within budget hotels and High-End A. In a similar manner, a relatively high prevalence of coli-

forms was associated with the TV remotes, bathroom faucets, and countertops (Table 3). The high number of coliform-positive samples across the hotel classes tested suggests the cost of stay has no influence over sanitary status. Toilet seats sampled in high-end hotels (56% failures) tested positive for coliforms with greater frequency compared to mid-range or budget hotels (Table 3). Telephone sets sampled in budget hotels had both high TAC loading and coliform-positive samples with the highest being units tested in Budget B (Table 3). In contrast, a lower number of coliform positive samples were recovered from telephones in the high-end hotels.

Bedside lamps and alarm clocks sporadically tested positive for coliforms and high TAC with no overall differences in failure rate based on class of hotel (Table 3).

Incidence of MRSA and *C. difficile*

A high prevalence of oxacillin-resistant bacteria was recovered from Budget A although isolates were recovered from rooms within all the hotel classes tested (Table 3). Antibiotic-resistant isolates (including MRSA) were recovered from different surfaces with the TV remote and telephone sets testing positive (Table 3). The bathroom faucet and countertop also harbored a relatively high prevalence of oxacillin-resistant bacteria that included MRSA. Collectively, oxacillin-resistant bacteria were recovered from 22% of surfaces with 46% of isolates being confirmed as MRSA.

Two toxigenic *C. difficile* were isolated over the course of the study. One isolate was recovered from the bathroom of Mid-Range B and the other from High-End B. Both isolates harbored toxins A and B but were devoid of binary toxin. The isolates could be grouped into toxinotype XXI (Mid-Range B) and XIII (High-End B).

Microbiological Quality of Ice

Ice was collected from up to three ice machines within each hotel and screened for HPC, coliforms, and *E. coli*. The HPC of ice varied between <1 and >4 log CFU/mL although counts did not correlate with the presence of coliforms or *E. coli* (Table 4). As far as indicators were concerned, coliforms were sporadically recovered from ice in each of the hotel classes (Table 4). Although the presence of coliforms in water would be considered in noncompliance (Bartram et al., 2004),

high levels (>50 CFU/100 mL) of the indicator were recovered in several machines sampled. Taking the results as a collective, 24% of the hotel ice machines sampled tested positive for fecal coliforms. *E. coli* was recovered from a single ice machine sampled in High-End A but not in any of the other units tested (Table 4).

Discussion

The overall objective of our study was to provide a baseline for the sanitary status of hotel rooms. As deduced by others, visual inspection has a place in assessing the cleanliness of surfaces but not the adequacy of sanitation (Tompkin, 2004). This was confirmed in the current study where although the majority of rooms appeared clean, the microbiological analysis revealed unsanitary surfaces.

ATP luminescence represents a rapid approach to assessing the sanitary status of surfaces (Shama & Malik, 2013). Yet it should be noted that ATP measurement represents an indirect means of assessing the microbial loading and is dependent on the cell type, in addition to metabolic status. It is also possible that nonmicrobial-derived ATP contributes to the RLU readings recorded (Aycicek, Oguz, & Karci, 2006).

In the current study it was notable that a high degree of variation of ATP readings occurred across hotel rooms associated with the same national chain. The result would suggest that variation also occurs in sanitation practices applied by workers. A more noteworthy result was that the average ATP readings for the designated surfaces did not differ among the different hotel classes. This could be attributed to the high degree of variation but more likely reflects that housekeeping of guest rooms focuses on cleaning as opposed to sanitation regardless of establishment class. An exception was found, however, with respect to the sanitary status of comforters within budget hotels that recorded high ATP readings, prevalence of coliforms, and oxacillin-resistant bacteria. From visual inspection it was evident that the comforter had not been changed in a number of the budget hotels. Yet it was also noted that the comforters in the high-end hotels also resulted in high ATP readings in addition to testing positive for coliforms.

Further surfaces with a high prevalence of coliforms were the TV remote and telephone touch pads. A common feature of comforters, TV remotes, and touch pads is that all repre-

TABLE 3
Microbiological Analysis of Different Surfaces Sampled Within Hotel Guest Rooms

Surface/Hotel	Failure (%)		% Positive (# Confirmed MRSA ^a)
	Total Aerobic Count	Coliforms	Oxacillin Resistance
Bedside lamp			
Budget A	11	22	22
Budget B	11	22	11 (2)
Mid-Range A	0	33	0
Mid-Range B	0	11	0
High-End A	22	22	11 (2)
High-End B	11	11	0
Alarm clock			
Budget A	14	14	14
Budget B	0	11	11
Mid-Range A	33	33	0
Mid-Range B	0	0	0
High-End A	17	17	17
High-End B	14	0	14
TV remote			
Budget A	22	67	67 (1)
Budget B	33	67	11 (3)
Mid-Range A	22	56	11 (1)
Mid-Range B	0	11	11
High-End A	11	67	44 (3)
High-End B	44	33	22
Telephone			
Budget A	33	33	78 (1)
Budget B	56	78	22 (1)
Mid-Range A	11	33	22 (1)
Mid-Range B	22	22	0
High-End A	22	22	22 (3)
High-End B	11	11	0

continued on page 13

sent high-contact surfaces that are problematic to sanitize. As a consequence, it may have been expected that the levels of contamination would have been similar across the hotel classes. It was noted that TV remotes from Mid-Range B had no failures in TAC levels, with a lower failure rate for coliforms. The low levels of contamination from the Mid-Range B TV remotes was likely attributed to the smooth design of the controller that would not accumulate contamination and would be more efficiently sanitized. Sanitary design is viewed as a critical factor within the

food and health care sectors, as well as hotel rooms (Tomaselli, 2006). Although surfaces such as TV remotes can be problematic to sanitize it was also noted that bathroom countertops and faucets resulted in a high percentage of failures. This was unexpected given that in general the surfaces were smooth and relatively easy to sanitize. The high prevalence of coliforms would provide further evidence of ineffective sanitation practices operating within the hotels.

A relatively high prevalence of oxacillin-resistant bacteria existed with 46% being

TABLE 3 continued from page 12

Microbiological Analysis of Different Surfaces Sampled Within Hotel Guest Rooms

Surface/Hotel	Failure (%)		% Positive (# Confirmed MRSA*)
	Total Aerobic Count	Coliforms	Oxacillin Resistance
Comforter			
Budget A	44	44	22
Budget B	44	56	44 (1)
Mid-Range A	33	33	0
Mid-Range B	0	11	0
High-End A	0	44	22 (1)
High-End B	17	17	0
Bathroom faucet			
Budget A	11	56	11 (1)
Budget B	0	33	0
Mid-Range A	22	44	22 (1)
Mid-Range B	0	11	22 (1)
High-End A	11	56	22
High-End B	11	56	11 (1)
Bathroom counter			
Budget A	11	22	56
Budget B	22	44	22 (1)
Mid-Range A	22	44	22 (2)
Mid-Range B	0	56	22 (1)
High-End A	0	22	11
High-End B	11	11	11
Toilet seat			
Budget A	0	22	11 (2)
Budget B	0	33	0
Mid-Range A	0	33	0
Mid-Range B	0	11	22 (2)
High-End A	11	56	22 (1)
High-End B	11	56	11

Note. The percentage failures in total aerobic count (>50 CFU per replicate organism detection and counting [RODAC] plate) and coliforms (>1 per RODAC plate) are illustrated along the samples positive for oxacillin-resistant bacteria, which includes methicillin-resistant *Staphylococcus aureus*.

*MRSA = methicillin-resistant *Staphylococcus aureus*.

confirmed as MRSA. The highest prevalence was recorded on the TV remote control and telephone surfaces that again would reflect the high contact and difficulty in sanitizing. No previous studies have reported the prevalence of antibiotic-resistant bacteria such as MRSA within hotel rooms. Indeed, only limited studies have been conducted about reporting incidence of MRSA in nonhospital environments. For example, gymnasiums have been highlighted as a potential source of

MRSA although the prevalence was considered to be <0.5% (Markley, Edmond, Major, Bearman, & Stevens, 2012). Roberts and co-authors (2013) performed a survey of high-contact areas (TV remote, microwave touch pad, flush handle, among others) within student residences and private homes. The researchers reported an MRSA prevalence of 11% for graduate housing that compared to 1.1% recovered in private residences (Roberts et al., 2013).

More detailed studies have been undertaken in health care settings given the established link between infections and environmental contamination. Faires and co-authors (2012) performed sampling within community hospitals within southern Ontario and reported MRSA prevalence of 11.8%. The study by Faires and co-authors (2012) was unique in that a range of surfaces was sampled that included carts, linens, gowns, sofas, chairs, and handrails. Such surfaces resemble those that were sampled within hotels rooms in our study. Within hospital settings the highest carriage of MRSA was found to be sofas, chairs, handrails, and keyboards. Other researchers have established the prevalence of MRSA within hospital environments being up to 54% (Dancer, 2008). Collectively, the MRSA prevalence recovered from hotel rooms was 8.8%, which can be considered comparable to that encountered in health care and student housing environments but higher than encountered within private residences.

The prevalence of *C. difficile* recovered from contact surfaces within hotel rooms was <1% with only two isolates being recovered. The prevalence compares to 2.4% reported in hospital environments (Faires et al., 2012) and 5.3% in private residences (Weese, Finley, Reid-Smith, Janecko, & Rousseau, 2010). Consequently, it can be concluded that the hotel environment represents a low risk in terms of acquiring *C. difficile*. Yet it was noted that both strains recovered from hotel environments were toxigenic, harboring both toxins A and B. The toxinotypes XXI and XIII recovered are relatively rare and neither have been implicated in clinical cases of *C. difficile* infections.

The ice samples taken from machines that serviced the rooms were found to harbor coliforms and on a single occasion, *E. coli*. In the current study, 22% of the ice samples screened contained coliforms. Ice is an established source of potential human pathogens, especially in developing nations where microbiological quality is low (Falcao, Falcao, & Gomes, 2004). Ice quality in industrialized nations has not been extensively reported. A survey of ice machines in hospitals reported a coliform prevalence of 69% (Wilson, Hogg, & Barr, 1997). The prevalence of coliforms in ice at retail outlets in the UK and Greece was 9% and 31%, respectively (Gerokomou et al., 2011; Nichols, Gillespie, & de Louvois,

2000). Therefore, the presence of coliforms in ice recovered from hotel ice machines is comparable to that of ice used in other settings. As with those studies, the conclusions highlight the potential for ice machines to be vehicles for human pathogens (Nichols et al., 2000).

Conclusion

It was evident that relying on visual assessment is a poor indicator of sanitary status of hotel rooms. ATP luminometer readings provided as assessment of contamination levels on surfaces although RLU values did not correlate strongly with TAC or coliform counts. The main purpose of ATP readings is not to attain a standard value but to be employed in trend analysis to assess if revisions to sanitation practices have been effective (Turner et al., 2010). Nevertheless, a standard is required in some form to designate if a surface has been satisfactorily sanitized. Such standards are established within the food and health sectors although are less obvious within a hotel room setting.

The high prevalence of MRSA is of concern although how the presence of the pathogen translates into infections remains open to speculation. Still, given the noted risk of transferring norovirus it can be anticipated that focusing on sanitation of contact surfaces rather than cleanliness alone will bring

TABLE 4
Coliforms and *E. coli* Levels Recovered From Ice Obtained From Hotel Ice Machines

Hotel Class	Indicator	CFU/100 mL		
		<1	1–50*	>50*
Budget A	Coliforms	3	0	1
	<i>E. coli</i>	4	0	0
Budget B	Coliforms	5	0	1
	<i>E. coli</i>	6	0	0
Mid-Range A	Coliforms	3	5	1
	<i>E. coli</i>	9	0	0
Mid-Range B	Coliforms	5	2	2
	<i>E. coli</i>	9	0	0
High-End A	Coliforms	6	2	0
	<i>E. coli</i>	7	1	0
High-End B	Coliforms	6	1	2
	<i>E. coli</i>	9	0	0

*Exceeds limits for compliance.

positive attributes in terms of controlling community-acquired infections. 🍷

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References

Aspinall, S.T., & Hutchinson, D.N. (1992). New selective medium for isolating *Clostridium difficile* from feces. *Journal of Clinical Pathology*, 45(9), 812–814.

Aycicek, H., Oguz, U., & Karci, K. (2006). Comparison of results of ATP bioluminescence and traditional hygiene swabbing methods for the determination of surface cleanliness at a hospital kitchen. *International Journal of Hygiene and Environmental Health*, 209(2), 203–206.

Bartram, J., Cotruvo, J., Exner, M., Fricker, C., & Glasmacher, A. (2004). Heterotrophic plate count measurement in drinking water safety management—report of an expert meeting Geneva, 24–25 April 2002. *International Journal of Food Microbiology*, 92(3), 241–247.

Boa, T.T., Rahube, T.O., Fremaux, B., Levett, P.N., & Yost, C.K. (2013). Prevalence of methicillin-resistant *Staphylococci* species isolated from computer keyboards located in secondary and post-secondary schools. *Journal of Environmental Health*, 75(6), 50–58.

Cheesbrough, J.S., Green, J., Gallimore, C.I., Wright, P.A., & Brown, D.W.G. (2000). Widespread environmental contamination with Norwalk-like viruses (NLV) detected in a prolonged hotel outbreak of gastroenteritis. *Epidemiology and Infection*, 125(1), 93–98.

Dancer, S.J. (2008). Importance of the environment in methicillin-resistant *Staphylococcus aureus* acquisition: The case for hospital cleaning. *Lancet Infectious Diseases*, 8(2), 101–113.

Dell, L.A. (1979). Aspects of microbiological monitoring for non-sterile and sterile manufacturing environments. *Pharmaceutical Technology*, 3, 47–51.

Faires, M.C., Pearl, D.L., Ciccotelli, W.A., Straus, K., Zinken, G., Berke, O., Reid-Smith, R.J., & Weese, J.S. (2012). A prospective study to examine the epidemiology of methicillin-resistant *Staphylococcus aureus* and *Clostridium difficile* contamination in the general environment of three community hospitals in southern Ontario, Canada. *BMC Infectious Diseases*, 12, 14.

Falcao, J.P., Falcao, D.P., & Gomes, T.A.T. (2004). Ice as a vehicle for diarrheagenic *Escherichia coli*. *International Journal of Food Microbiology*, 91(1), 99–103.

References

- Gastmeier, P. (2010). Healthcare-associated versus community-acquired infections: A new challenge for science and society. *International Journal of Medical Microbiology*, 300(6), 342–345.
- Gerokomou, V., Voidarou, C., Vatopoulos, A., Velonakis, E., Rozos, G., Alexopoulos, A., Plessas, S., Stavropoulou, E., Bezirtzoglou, E., Demertzis, P.G., & Akrida-Demertzi, K. (2011). Physical, chemical, and microbiological quality of ice used to cool drinks and foods in Greece and its public health implications. *Anaerobe*, 17(6), 351–353.
- Guzman-Herrador, B., Heier, B.T., Osborg, E.J., Nguyen, V.H., & Vold, L. (2011). Outbreak of norovirus infection in a hotel in Oslo, Norway, January 2011. *Eurosurveillance*, 16(30), 5.
- Hawken, P., Weese, J.S., Friendship, R., & Warriner, K. (2013). Carriage and dissemination of *Clostridium difficile* and methicillin-resistant *Staphylococcus aureus* in pork processing. *Food Control*, 31(2), 433–437.
- Khanna, S., Pardi, D.S., Aronson, S.L., Kammer, P.P., Orenstein, R., St. Sauver, J.L., Harmsen, W.S., & Zinsmeister, A.R. (2012). The epidemiology of community-acquired *Clostridium difficile* infection: A population-based study. *American Journal of Gastroenterology*, 107(1), 89–95.
- Lee, B.Y., Bartsch, S.M., Wong, K.F., Singh, A., Avery, T.R., Kim, D.S., Brown, S.T., Murphy, C.R., Yilmaz, S.L., Potter, M.A., & Huang, S.S. (2013). The importance of nursing homes in the spread of methicillin-resistant *Staphylococcus aureus* (MRSA) among hospitals. *Medical Care*, 51(3), 205–215.
- Li, Y.-M., Zhao, X.-H., & Xu, Z.-Z. (2012). Development of a novel chromogenic medium MRSASelect on the rapid detection and identification of methicillin-resistant *Staphylococcus aureus*. *Zhongguo Kangshengsu Zazhi*, 37(11), 813–816.
- Malcolm, B. (2011). The rise of methicillin-resistant *Staphylococcus aureus* in U.S. correctional populations. *Journal of Correctional Health Care: The Official Journal of the National Commission on Correctional Health Care*, 17(3), 254–265.
- Mannapperuma, W.M.G.C.K., Abayasekara, C.L., Herath, G.B.B., Werellagama, D.R.I.B., & Heinonen-Tanski, H. (2011). Comparison of bacteriological methods for detecting and enumerating total coliforms and *Escherichia coli* in water. *Research Journal of Microbiology*, 6(12), 851–861.
- Markley, J.D., Edmond, M.B., Major, Y., Bearman, G., & Stevens, M.P. (2012). Are gym surfaces reservoirs for *Staphylococcus aureus*? A point prevalence survey. *American Journal of Infection Control*, 40(10), 1008–1009.
- Nichols, G., Gillespie, I., & de Louvois, J. (2000). The microbiological quality of ice used to cool drinks and ready-to-eat food from retail and catering premises in the United Kingdom. *Journal of Food Protection*, 63(1), 78–82.
- Roberts, M.C., Soge, O.O., & No, D. (2013). Comparison of multi-drug resistant environmental methicillin-resistant *Staphylococcus aureus* isolated from recreational beaches and high touch surfaces in built environments. *Frontiers in Microbiology*, 4, 74.
- Schulze, G., & Hildebrandt, G. (2007). The representativeness of the RODAC-technique. *Fleischwirtschaft*, 87(4), 213–219.
- Shama, G., & Malik, D.J. (2013). The uses and abuses of rapid bioluminescence-based ATP assays. *International Journal of Hygiene and Environmental Health*, 216(2), 115–125.
- Thigpen, J.E., Caviness, G.F., Whiteside, T.E., Locklear, J., Grant, M., & Forsythe, D. (2009). The use of ATP-based methods or RODAC plates for monitoring the effectiveness of sanitation procedures in an animal facility. *Journal of the American Association for Laboratory Animal Science*, 48(5), 548–548.
- Tomaselli, Y. (2006). Integrated management of cleaning and disinfection programs for bio-adhesion control and biofilm removal in food industries—a review. *Mitteilungen aus Lebensmitteluntersuchung und Hygiene*, 97(4), 209–225.
- Tompkin, R.B. (2004). Environmental sampling—a tool to verify the effectiveness of preventive hygiene measures. *Mitteilungen aus Lebensmitteluntersuchung und Hygiene*, 95(1), 45–51.
- Turner, D.E., Daugherty, E.K., Altier, C., & Maurer, K.J. (2010). Efficacy and limitations of an ATP-based monitoring system. *Journal of the American Association for Laboratory Animal Science*, 49(2), 190–195.
- Weese, J.S., Finley, R., Reid-Smith, R.R., Janecko, N., & Rousseau, J. (2010). Evaluation of *Clostridium difficile* in dogs and the household environment. *Epidemiology and Infection*, 138(8), 1100–1104.
- Wilson, I.G., Hogg, G.M., & Barr, J.G. (1997). Microbiological quality of ice in hospital and community. *Journal of Hospital Infection*, 36(3), 171–180.

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▶ INTERNATIONAL PERSPECTIVES/SPECIAL REPORT

The Role of Health Impact Assessment in Advancing Sustainable Development in Latin America and the Caribbean

Although most of the information presented in the Journal refers to situations within the United States, environmental health and protection know no boundaries. The Journal periodically runs International Perspectives to ensure that issues relevant to our international membership, representing over 25 countries worldwide, are addressed. Our goal is to raise diverse issues of interest to all our readers, irrespective of origin.

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Kwiat Inc.

Abstract The World Health Organization's (WHO's) Commission on Social Determinants of Health formally adopted Health Impact Assessment (HIA) more than a decade ago as a promising concept to address underlying health issues. Latin America and the Caribbean (LAC) remains one of the regions of the world with minimal application of HIA in public programs and policies. This special report documents the need for public mechanisms to incorporate HIA, the benefits from its application, and steps to promote its use. The authors discuss the role of HIA in the sustainable development of LAC to address social determinants of health.

Introduction

At the first meeting of the Health and Environment Ministers of the Americas in 2002, the ministers identified the need to strengthen linkages between institutions working in the health and environment fields through the implementation of the 1995 Pan American Charter on Health and the Environment in Sustainable Human Development. The Health Impact Assessment (HIA) methodology has been applied for more than two decades as a means to estimate health outcomes, influence decision making, and incorporate health recommendations into the planning of projects and policies (Scott-Samuel, 2005). The definition issued during the 1999 Gothenburg consensus statement is as follows: "a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population and the

distribution of those effects within the population (Diwan, Douglas, & Karlber, 2001)."

Current HIA practice is influenced by its origins in environmental policy, social determinants of health (SDH), healthy public policy, and addressing inequities. SDH are defined as a complex array of environmental, social, political, and economic factors that influence health status and equity (Rasanthan, Montesinos, Matheson, Etienne, & Evans, 2010). The multiple origins of HIA contribute to distinct applications within and between countries. In the public and private sectors HIA is highly valued as a method to enhance policy, health promotion, and participation in high-resource countries (Wernham, 2013) and it is gaining interest in low-resource countries (Winkler et al., 2013). Incorporating HIA as a standard practice to address environmental threats and promote health and well-being is believed to reduce

costs otherwise born by health systems and communities (Bos, 2006).

The HIA process includes a series of steps permitting public health planners and other sectors a framework to consider the SDH implications on a project or policy. This process includes steps for prioritization, analysis, recommendations, monitoring, and evaluation (Kemmm, 2013). Minimum standards of practice were developed in 2010 (Bhatia et al., 2010) and specific human skills required for successful application (Birley, 2011).

Internationally, HIA methods have in common the application of a structured assessment with an SDH approach (Birley, 2011). The modification of SDH outside the health sector is an integral part of the HIA approach to influence decision making and healthy public policies. Approaches like Health in All Policies (HiAP) conceptualize the inclusion of SDH through intersectoral collaboration (Scott-Samuel, 2005). HIA mutually supports the incorporation of health into other sectors with a strong focus on issues of health equity across vulnerable populations. Agriculture, mining, energy production, housing, and transportation are common examples of sectors where HIA has been applied to benefit population health (Collins & Koplan, 2009). While the concepts, methods, and tools associated with HIA are generally well established, the rationale for implementation is varied. They include evidence-based decision making, advocacy, sustainable development, and establishing linkages between health and the environment.

In 2002 the World Summit on Sustainable Development (Kwiatkowski, 2002) identified five key activities needed to incorporate HIA in decision making:

- 1) increased HIA training for environmental assessment practitioners and health professionals;
- 2) interdisciplinary management decision-making mechanisms for projects, programs, and policies;
- 3) greater efforts by developed countries to assist in training and capacity building of health professionals within developing countries to break the cycle of dependency on outside experts;
- 4) international strengthening of existing HIA networks and institutions and better management of information and science to provide decision makers with solid understanding of global, regional, and local environmental health issues; and
- 5) increased community-level empowerment since it is in local communities that policies, programs, and projects take shape as instruments to improve the lives and livelihoods of people.

Despite significant advances in HIA practice and institutionalization worldwide, 20 years after the Pan American Charter on Health and the Environment in Sustainable Human Development, HIA remains an uncommon practice in Latin America and the Caribbean (LAC). This report, based upon a situational analysis of the region and the existing literature, summarizes the current HIA application, potential benefits from regional scale up, and recommendations for advancing the practice.

HIA in LAC

LAC remains one of the most unequal regions of the world, perpetuated largely through disparities in SDH such as education and poverty. Inequality persists in spite of improvements in growth, development, and income (Lopez & Perry, 2008; Povall, Haigh, Abrahams, & Scott-Samuel, 2013). The long history of social and environmental injustice in the region (Berger & Siniero, 2012) supports approaches that provide positive modification to SDH associated with development.

It is well recognized that poor social and environmental management undermines economic and social investment to alleviate poverty and improve quality of life. The HIA

application aligns well with LAC sustainable development goals to influence health “upstream” and promote intersectoral collaboration (United Nations, 2012). As public health sector budgets for low- and middle-resource countries are typically small compared with other sectors (Birley, 2010), they are limited in modifying SDH. Therefore, policies, methodologies, and processes are necessary to encourage public health engagement of nonhealth sectors.

LAC lags behind the U.S., European nations, Canada, and others in HIA application, promotion, and evidence base to support its application (Kemmm, 2013; O’Mullane, 2013). The practice of impact assessment as a prospective decision making tool in LAC to determine social, environmental, economic, and health effects of projects and policies remains inconsistent (Collins & Koplan, 2009; Espinoza, 2007; Wood, 2003). Despite the understood relationship between health and sustainable development, few LAC countries optimize the estimation of health and well-being through the use of impact assessment tools. While HIA has been successful at addressing SDH in North America (Bhatia & Wernham, 2008; Collins & Koplan, 2009; Kwiatkowski & Ooi, 2003) limited evidence exists on its application in LAC.

Within LAC, agriculture, energy and mining, transportation, and housing represent sectors with significant untapped potential for addressing health-related externalities associated with SDH. (Astete et al., 2012; Becerra et al., 2013, Comaru & Westphal, 2004; Sanoff et al., 2010). Mining investments in LAC are among the highest in the world, totaling \$192 billion and 28% of total world investment (International Council on Mining and Metals, 2012). Although the community health impacts associated with mining are understood, they are oftentimes not appropriately defined, addressed, and monitored (Goodland, 2012). Furthermore, impact assessments do not adequately consider health or inclusion of the health authority in the process. Inclusion of the health authority when forming recommendations for future mining communities provides a more sustainable platform to address the long-term modification of determinants.

Despite the value gained from integration of health into the planning of nonhealth sectors, the application of HIA has largely been

limited to approval mechanisms for private-sector projects. Examples of exceptions are Mexico, where HIA guidelines were developed by the Ministry of Health (MoH) (Dirección General de Promoción de la Salud, 2012) and HIA was applied to estimate morbidity related to atmospheric contamination (Riojas, 2009). In Brazil, a center for sustainable development was created within the MoH with a mandate to coordinate HIA activities for large development projects associated with infectious disease and human migration (Silveira et al., 2012). In Peru, the World Health Organization/Pan American Health Organization are using HIA tools to assess human risks related to wastewater reuse (M.S. Winkler, personal communication, January 2014) and promote healthy public policies in mining (Drewry, 2014). These examples provide some initial evidence of HIA’s value to address SDH and produce evidence that may influence policies in nonhealth sectors.

Promoting the Practice in LAC

In spite of decades of HIA training in LAC (Asociación de Universidades Amazónicas, 1999; World Health Organization, 2000, 2001) public sector application remains limited to its inclusion in the Environmental Impact Assessment (EIA) process, oftentimes without adequate consideration of health. Solely relying on EIA to analyze health and well-being may not be sufficient or adequate to engage public health professionals in the process. At present no examples exist of HIA institutionalization at the local or country level in LAC. The following recommendations are based upon past HIA efforts in the region, interviews with practitioners, and author perspectives on advancing the practice.

Determine barriers and enablers for diffusion of HIA in the region. Upon determination of countries that value HIA but lack institutional mechanisms for practice, an organizational analysis of key institutions should be completed. This analysis provides HIA-enabling institutions, health and environment regulations, and the role of key sectors that can strategically influence health. This includes country-specific data on the status of EIA and HIA policies, practices, laws, and regulations.

Promote awareness and knowledge. The establishment of networks of HIA practitioners nationally and regionally diffuses infor-

mation to promote the practice. One example of this recently underway is the effort to form linkages between national health institutes for the practice of HIA related to mining in Andean countries (Drewry, 2014). As the LAC region integrates SDH, equity, and healthy public policy approaches into health systems, HIA should be included as a mutually supportive methodology. Despite the global dissemination of HIA guidance tools, adequate materials to move from theory to practice are not available in Spanish and Portuguese. Finally, experienced regional trainers and resource centers are necessary to increase awareness and application.

Training of the health authority. Although limitations may exist in both capacity and regulation for HIA within the MoH, it represents the most appropriate champion. Literature from other regions highlight facilitating factors for establishment of HIA programs as an existing emphasis on public health and mutual interest between ministries in the achievement of joint objectives (O'Mullane, 2013). Hence the development of workforce skills within the MoH (e.g., systematic screening procedures to prioritize projects or policies requiring an HIA) and mechanisms for linking with other sectors are essential. Developing a mandate within the MoH to commission, lead, respond to, and make recommendations related to HIA are further requirements of effective programs for the region.

Create a favorable environment for national policy development. Each country has differing approaches to institutionalization in terms of HIA scope, mandate, local vs. national approach, and stand alone or integrated. Generally, LAC institutionalization of HIA requires high-level political support. One means of enhancing HIA as a structured mechanism to promote healthy public policies may be through a Strategic Health Impact Assessment (SHIA) (Joffe, 2008, 2010). Compared to HIA, the SHIA has a national or regional perspective

and is conducted by professionals in specific topical areas, focusing more on establishing an evidence base. Its application strategically targets a sector and explores the impact of key policies with the potential to influence burden of disease. In turn the process establishes a framework and reference material for future work in the sector (Joffe, 2008). An example of this is the use of SHIA for mining and community health at the national level rather than a site-specific project. The application of SHIA in LAC would be useful in influencing national policies, informing the private/public sectors, and disseminating scientific evidence among countries.

Additional actions to promote national HIA policies are 1) establish an evidence base by prioritizing technical assistance to countries with established mechanisms for sustaining an HIA approach; 2) establish HIA training for nongovernmental institutions (universities and community-based organizations); and 3) integrate HIA into transnational development projects as a platform for country collaboration, establish HIA networks, share best practices, and encourage as a cornerstone of sustainable development.

Conclusion

The application of HIA in LAC is potentially a cost-effective strategy for targeting a range of SDH for development projects, programs, and policies. The establishment of HIA as a common practice within health systems will require additional actions for its incorporation in standard public policy. These include clear government objectives on establishment of public health systems, ability for ministries to collaborate on joint objectives, and development of a strong evidence base to enable a meaningful analysis of health and well-being.

It is only now being recognized that sustainable development requires a holistic understanding of the complex interrelationships between the human and natural

environments. HIA has become an important component of the planning cycle and safeguards approach in many countries and financial institutions (International Finance Corporation, 2009). It is one means to embed public health across development proposals and policy sectors. Considering previous LAC efforts, practical operational tools and methods are required for stakeholders to easily understand and embrace HIA. A considerable challenge within LAC is the limited understanding within health and nonhealth sectors of the HIA application or recognition of its use in informing policies.

Ultimately the success of HIA will depend upon its integration into local or national health strategies. Its application by the public sector to modify determinants, protect communities, and address health inequities is promising for the sustainable development of the region.

Previous training and capacity building for HIA in the region has focused on communicable disease and the physical environment. The changing regional global disease burden will require additional emphasis placed on establishing policies that positively effect noncommunicable disease, health inequalities, and SDH. North America and Europe have made great strides in the application and creating an evidence base for HIA. Expansion of its practice in LAC will require a strategic focus based upon regional development and health concerns as well as financial support from donor communities. The existence internationally of HIA methodologies and procedures, train-the-trainer courses, and international networks of expertise and knowledge could be used to quickly enhance its application within the region.

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References

Asociación de Universidades Amazónicas/International Development Research Center. (1999). *Environmental health impact assessment (EHIA) program*. Proceedings from course workshop, Lima, Peru.

Astete, J., Gastanaga, M., Fiestas, V., Oblitas, T., Sabastizagal, I., Lucero, M., Abadie, J., Muñoz, M.E., Valverde, A., & Suarez, M. (2010). Enfermedades transmisibles, salud mental y exposición a contaminantes ambientales en población aledaña al proyecto

References

- minero Las Bambas antes de la fase de explotación, Perú 2006. *Revista Peruana de Medicina Experimental y Salud Pública*, 27(4), 512–519.
- Becerra, M.B., Rets, R.S., Frank, L.D., Ramirez-Marrero, F.A., Welle, B., Cordero, E.A., Paz, F.M., Crespo, C., Dujon, V., Jacoby, E., Dill, J., Welgand, L., & Padin, C.M. (2013). Transport and health: A look at three Latin American cities. *Cad de Saude Publica*, 29(4), 654–666.
- Berger, M., & Siniero, C.C. (2012). Environmental justice in Latin America. *Environmental Justice*, 5(2), 63–64.
- Bhatia, R., Branscomb, J., Farhang, L., Lee, M., Orenstein, M., & Richardson, M. (2010). *Minimum elements and practice standards for health impact assessment, version 2*. Oakland, CA: North American HIA Practice Standards Working Group.
- Bhatia, R., & Wernham, A. (2008). Integrating human health into environmental impact assessment: An unrealized opportunity for environmental health and justice. *Environmental Health Perspectives*, 116(8), 991–1000.
- Birley, M. (2011). *Health impact assessment: Principles and practices*. New York: Earthscan.
- Bos, R. (2006). Health impact assessment and health promotion. *Bulletin of the World Health Organization*, 84(11), 914–915.
- Collins, J., & Koplan, J.P. (2009). Health impact assessment: A step towards health in all policies. *Journal of the American Medical Association*, 302(3), 315–317.
- Comaru, F.A., & Westphal, M.F. (2004). Housing, urban development and health in Latin America: Contrasts, inequalities, and challenges. *Environmental Health Perspectives*, 19(3), 329–345.
- Dirección General de Promoción de la Salud, México. (2012). Análisis de impacto en salud: Marco conceptual, versión 1.0. Subsecretaría de prevención y promoción de la salud.
- Diwan, V., Douglas, M., & Karlber, I. (2001, October). *Health impact assessment: From theory to practice*. Report on the Leo Kaprio Workshop, Gothenburg, Sweden.
- Drewry, J. (2013). *Summary, conclusions, and products from health impact assessment workshop for mining in Chile and Peru* [article in Spanish]. Retrieved from http://www.paho.org/per/index.php?option=com_content&view=article&id=2541:en-tallerse-presenta-metodologia-analisis-evaluacion-de-impacto-en-salud-ais-para-su-aplicacion-a-la-industria-minera-de-chile-y-peru&catid=1050:noticias-2013&Itemid=900
- Espinoza, G. (2007). *Gestión y fundamentos de evaluación de impacto ambiental* (Report No. ATN/JF-6618-RG). Santiago, Chile: Banco Interamericano de Desarrollo y Centro de Estudios para el Desarrollo.
- Goodland, R. (2012). Guatemala's Marlin gold mine: Suggestions to rectify its most serious errors. *Business and Human Rights Resource Center*. Retrieved from <http://business-humanrights.org/en/guatemala%E2%80%99s-marlin-gold-mine-suggestions-to-rectify-its-most-serious-errors-paper-on-suggestions-to-reduce-its-social-and-environmental-impact#c67739>
- International Council on Mining and Metals. (2012). *Trends in the mining and metals industry*. Retrieved from <http://www.icmm.com/trends-in-the-mining-and-metals-industry>
- International Finance Corporation, World Bank Group. (2009). *Introduction to health impact assessment*. Washington, DC: Author.
- Joffe, M. (2008). The need for strategic health assessment. *European Journal of Public Health*, 18(5), 439–440.
- Joffe, M. (2010). The role of strategic health impact assessment in sustainable development. *International Journal of Green Economics*, 4(1), 1–16.
- Kemm, J. (2013). *Health impact assessment: Past achievement, current understanding, and future progress*. England: Oxford University Press.
- Kwiatkowski, R.E. (2002). Health impact assessment: Miles to go before we sleep (pp. 34–37). In *Environmental assessment year-book 2002: The EA agenda for Johannesburg and beyond*. Manchester, UK: Institute of Environmental Management and Assessment, University of Manchester.
- Kwiatkowski, R.E., & Ooi, M. (2003). Integrated environmental impact assessment: A Canadian example. *Bulletin of the World Health Organization*, 81(6), 434–438.
- Lopez, J.H., & Perry, G. (2008). *Inequality in Latin America: Determinants and consequences*. Washington, DC: The World Bank.
- O'Mullane, M. (2013). *Integrating health impact assessment with the policy process: Lessons learned from around the world*. England: Oxford University Press.
- Povall, S.L., Haigh, F.A., Abrahams, D., & Scott-Samuel, A. (2013). Health equity impact assessment. *Health Promotion International*, 29(4), 621–633.
- Rasanathan, K., Montesinos, E.V., Matheson, D., Etienne, C., & Evans, T. (2010). Primary health care and the social determinants of health: Essential and complementary approaches for reducing inequities in health. *Journal of Epidemiology and Community Health*, 65(8), 656–660.
- Riojas, H. (2009). Estado del conocimiento sobre los efectos en la salud asociados a la contaminación del aire en la población de la zona metropolitana de la Ciudad Mexico. Informe Final, Cuernavaca, Morelia.
- Sanoff, S.L., Callejas, L., Alonso, C.D., Hu, Y., Colindres, R.E., Chin, H., Morgan, D.R., & Hogan, S.L. (2010). Positive association with renal insufficiency with agricultural employment and unregulated alcohol consumption in Nicaragua. *Renal Failure*, 32(7), 766–777.
- Scott-Samuel, A. (2005.) Health impact assessment: An international perspective. *New South Wales Public Health Bulletin*, 16(7–8), 110–112.
- Silveira, M., Padilha, J.B., Schneider, M., Amaral, P.S., Machado do Carmo, T.F., Netto, G.F., & Rohlfs, D.B. (2012). Perspective of the health impact assessment in development projects in Brazil: Strategic importance for sustainability [article in Portuguese]. *Cad Saude Colet*, 20(1), 57–63.

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References *continued from page 19*

- United Nations. (2012). *Report of the United Nations conference on sustainable development*. Rio de Janeiro: Author.
- Wernham, A. (2013). *Ounces of prevention: Health impact assessments can help improve public policy, health outcomes*. Retrieved from <http://iom.edu/Global/Perspectives/2013/OuncesOfPrevention.aspx?page=-33>
- Winkler, M.S., Krieger, G.R., Divall, M.J., Cisse, G., Wielga, M., Singer, B.H., Tanner, M., & Utzinger, J. (2013). Untapped potential of health impact assessment. *Bulletin of the World Health Organization*, 91(4), 298–303.
- Wood, C. (2003, November). Environmental impact assessment in developing countries: An overview. Paper presented at the *Conference on New Directions in Impact Assessment for Development*, Manchester, England.
- World Health Organization. (2000). *Intersectoral decision-making skills in support of health impact assessment of development projects* (Final report on the development of a course addressing health opportunities in water resource management). Geneva: Author.
- World Health Organization. (2001). *Health impact assessment in development policy and planning* (Report of an informal WHO consultative meeting, Cartagena, Colombia). Geneva: Author.

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What Does the Public Know About Environmental Health? A Qualitative Approach to Refining an Environmental Health Awareness Instrument

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Abstract Despite an increased level of interest in environmental health concerns among the American public, awareness of the risks associated with environmental hazards is generally lacking. Assessing population awareness is typically performed through surveys, yet a comprehensive national environmental health questionnaire is currently unavailable. In 2009, a Delphi study using environmental health experts from federal, state, and local government and academia identified 11 core areas of environmental health (air, water, radiation, food safety, emergency preparedness, healthy housing, infectious disease and vector control, toxicology, injury prevention, waste and sanitation, and weather and climate change) and provided content validity for 443 questions covering 25 specific topics for possible inclusion on a national instrument. The authors' study described in this article used the qualitative approach of focus groups to refine the questions. Questions were divided into four sections and randomly assigned to a focus group location; 32 individuals participated. Results indicated that many perceptions are based on misinformation (or lack of information), which may lead to poor environmental health decision making.

Introduction

According to the World Health Organization (WHO, 2011), environmental health focuses on the physical, chemical, and biological aspects peripheral to individuals as well as the interconnected factors influencing a person's behavior. Likewise, it also includes the impact of individuals on the environment. Thus, environmental health incorporates all environmentally related attributes that are capable of negatively affecting human health (Bearer, 1995; Morrone, 2001; WHO, 2011).

Although several studies have addressed aspects of environmental health (Chepesiuk,

2007; Dunlap & Van Liere, 1978; Howe, 1990; Scott & Willits, 1994; Tempte & McCall, 2001; Weigel & Weigel, 1978), the field is so broad that the studies do not present a comprehensive understanding of overall awareness of environmental health issues. For example, Tempte and McCall (2001) used a short 14-question survey (of which only seven questions addressed environmental health) to assess patient attitudes about environmental health and found that risk awareness was generally lacking. Burger and Gochfeld (2008) examined fish consumption and found that many people have heard about environmental

health issues but fail to identify specific information about risks or benefits.

Prior to changing a behavior, individuals must have knowledge about both the risk factors and the methods by which risk factors can be reduced (Maibach & Cotton, 1995). Knowledge about an environmental issue or hazard can affect how one perceives and responds to a health risk. Unfortunately, many individuals do not realize the level of risk attributed to exposure to environmental hazards and the consequences to their health and well-being (Baird, 1986). Research has shown, however, that the higher the degree of personal injury and more uncertain the risk, the more individuals believe that the government should act to mitigate that risk (Dixon, Hendrickson, Ercolano, Quackenbush & Dixon, 2009; WHO, 2002).

In addition, the amount of knowledge an individual has concerning a topic directly impacts attitudes that are associated with health (Ratnapradipa, Brown, Middleton, & Wodika, 2011). Attitudes are vital because they can affect the behavior of an individual, such as preparing for an environmental risk or how to act during an environmental hazard (Andresen & Bouldin, 2010). Therefore, knowledge, attitudes, and behaviors shape the basic components needed for health awareness, concern, and promotion. Gaining an understanding of the population's awareness is typically performed through the administering of established surveys (Baird, 1986; Bianco, Nobile, Gnisci, & Pavia, 2008; Dixon et al., 2009; Tempte & McCall, 2001). A comprehensive established survey does not exist, however, to measure the general pub-

TABLE 1

Summation of Delphi Rounds I, II, and III

Core Areas (Delphi Round I)	Topic Areas (Delphi Round II)	Total Questions (Delphi Round III)
Air	Smoking and secondhand smoke	15
	Carbon monoxide	21
	General air quality	9
	Asthma	18
	Radon	19
	Mold	10
Water	Water sources	18
	Drinking water	23
	Water usage	13
	Wastewater	19
Weather and climate change	General weather and climate change	26
Food safety	Food preparation and storage	38
	Food supply	27
Healthy housing	General healthy housing	27
Waste and sanitation	Recycling	19
	Garbage and disposal	8
Infectious disease and vector control	Integrated pest management	16
	Communicable disease	15
Radiation	General radiation	20
Injury prevention	General injury prevention	9
Emergency preparedness	General emergency preparedness	10
Toxicology	Heavy metals	24
	Pesticides	22
	General toxicology	7
	Drugs	10
11 core areas	25 topic areas	443 questions

lic's knowledge, attitudes, and beliefs about environmental health.

After the creation of novel survey questions, a focus group is generally conducted in order to assess the clarity and construct validity of the measure. By utilizing a focus group, researchers can ensure that the target population understands what is being asked and can therefore respond appropriately (Lobdell, Gilboa, Mendola, & Hesse, 2005). Focus groups work best when participants feel as though their opinions are being respected and that they can comment freely without being critiqued. Focus group interviews are made up of 4–10 people and have five main features. These components include people, unique characteristics, qualitative data, focused discussion, and a desire to understand the topic of interest (Krueger & Casey, 2009).

Study Purpose

The goal of our study was to refine a newly constructed environmental health survey instrument through focus group discussion. While many environmental health studies have incorporated the use of focus groups (Scammell, 2010), qualitative methods are not typically employed in this field (Lobdell et al., 2005). The use of focus groups in environmental health research could provide new information about instrument development, encourage policy change, and assist public health officials in addressing environmental health illiteracy (Lobdell et al., 2005).

Methods

Instrument Development

In 2009, a Delphi study using environmental health experts from federal, state, and local

government and academia identified 11 core areas of environmental health (air, water, radiation, food safety, emergency preparedness, healthy housing, infectious disease and vector control, toxicology, injury prevention, waste and sanitation, and weather and climate change). The study was able to identify 25 specific topic areas within those core areas and provided content validity for 443 questions that were developed to address all identified topics (Ratnapradipa, Brown, & Wodika, 2011). Due to the length of the entire questionnaire, the instrument was divided into four separate sections (labeled A–D) to reduce respondent fatigue. Each focus group was given one of the four sections (Table 1).

Focus Group Locations

Over the course of a two-month period, focus groups were conducted at shopping centers in four different locations: Marion, Illinois; Paducah, Kentucky; St. Louis, Missouri; and Orlando, Florida. Focus group locations were largely based on proximity to the researchers. The Florida site was selected to potentially provide insights from another region of the country with different demographics. Due to budgetary constraints, other locations within the U.S. were not sampled.

Participant Recruitment

A total of 18 males and 14 females participated in our study. Survey participants varied in multiple demographics including age, race, occupation, and location. The human subjects committee institutional review board approved our project prior to recruitment. The only requirements for participation were that individuals had to be at least 18 years old and be able to read and understand English. The recruiter selected a shopping mall entrance and approached passersby with the opportunity to participate in the focus group. Numbers were not recorded on how many people declined to participate. Either on the day prior or the day of the focus group, depending on location, participants were recruited at local shopping malls between the hours of 4:30 and 6:30 p.m. This time schedule allowed those who work during the day to have an equal chance of being recruited. Participants who signed up for the session received an informational sheet containing the time and location of the focus group, procedures to be

used during the session, and general information pertaining to the study. Participants were directed to a predetermined restaurant located either in the shopping center or within five miles and were informed that by participating, they would receive a free meal and their names would be entered into a drawing to win a \$100 shopping gift card.

Focus Group

Multiple research team members including principal investigators and research assistants conducted the focus groups with the exception of the Florida focus group, which only had one team member present. A digital recording device was used during focus group discussions to record the comments and concerns of participants. Research assistants also took notation during the focus group sessions in order to note precise participant comments and reactions. All focus groups included four to eight participants and lasted approximately two to three hours. When participants arrived for the session, they were asked to sign two consent forms: one to participate in the focus group and another providing permission to be audio taped during the focus group. When all participants for the group arrived, each was given a complimentary meal and a copy of the survey. Upon completion of the survey, participants were asked 10 semistructured interview questions to facilitate discussion about clarity and construct validity of survey items (Table 2). Guided questions were based on several themes including clarity, comprehension, and application. To maintain anonymity, participants did not say their own or each other's names during the recording.

Data Analysis

Audio recordings from each focus group discussion were transcribed and then analyzed for common threads to discern themes among individual focus groups. All recordings were destroyed at the completion of the data analysis to ensure confidentiality of the participants. Transcriptions were tabulated for word frequency to identify themes.

Results

Although each focus group examined a different section of the environmental health questionnaire (A, B, C, or D), all groups were given the same cover page explaining both the purpose of the questionnaire and the purpose

TABLE 2	
Example Questions for Each Variable Within the Environmental Health Core Areas	
Core Area: Air	
Knowledge	Acid rain causes damage only to wildlife and humans. People who live around airports have a greater risk of developing cancer.
Attitude	There should be higher taxes for automobiles that produce more emissions. I would be willing to pay more money for products if it made the air cleaner.
Behavior	I use an air purifier in my home. I am careful to monitor my behaviors to not increase air pollution.
Core Area: Emergency Preparedness	
Knowledge	Your county health department is responsible for coordinating all activities in case of a disaster in your community. A disaster kit should contain one gallon of water per person per day for 72 hours.
Attitude	I count on my county health department in case of a natural disaster. I am willing to spend free time to help nursing homes prepare for an emergency.
Behavior	Do you have an emergency phone list by your telephone? Do you have an out of area contact?
Core Area: Food Safety	
Knowledge	To prevent the possibility of foodborne illness, chicken should be cooked to 160°F. Hepatitis A is an example of a foodborne illness.
Attitude	There is too much information on my food labels. The media makes too big a deal of food allergies.
Behavior	I know to what temperature meats should be cooked. I have a thermometer in my fridge to ensure foods are stored at cold temperatures.
Core Area: Healthy Housing	
Knowledge	Mold can cause many health effects, including asthma. Asbestos is no longer a concern in residential areas.
Attitude	Indoor air pollution is just a myth. We spend too much time talking about healthy housing issues.
Behavior	I use eye protection when using cleaning chemicals. I test my smoke or carbon monoxide alarm often.
Core Area: Injury Prevention	
Knowledge	The only risk with a swimming pool is drowning.
Attitude	I don't think it is necessary to wear ear protection. I like to listen to music loud.
Behavior	I have installed nonslip threads for my floors or noncarpeted stairs. I have a nightlight in my home to reduce accidental injuries.
Core Area: Infectious Disease and Vector Control	
Knowledge	Instant hand sanitizer is not more effective than soap and water to wash your hands. For hand washing to be effective you must use hot water and soap and wash for a minute or more.
Attitude	People get too worried about Lyme disease. People with the flu should wear masks whenever they are in the public.
Behavior	I go to the doctor every time I am sick. I store excess cardboard in my home for future use.
<i>continued on page 25</i>	

of the focus group. The questions “How clear was the purpose of this survey? What do you think the purpose of this survey was?” were interpreted differently depending on the individual and the focus group. Individuals in the

Kentucky group thought the purpose of the survey was to “make people more aware,” “pollution,” “environment,” or “trying to get the government to pay for it.” One participant in the Illinois focus group stated he thought

TABLE 2 continued from page 24

Example Questions for Each Variable Within the Environmental Health Core Areas

Core Area: Radiation	
Knowledge	The U.S. Environmental Protection Agency recommends that sunglasses block 75% of UVA and UVB rays. UVB can penetrate clothing.
Attitude	People make too big a deal about sunscreen. Using tanning salons occasionally is okay.
Behavior	I know what the sources of radiation include. I know where to find information regarding the UV index on any given day.
Core Area: Toxicology	
Knowledge	Methamphetamine (meth) labs in rural areas can lead to environmental health issues. Large, predatory fish contain higher levels of contaminants than smaller younger fish.
Attitude	People make too big a deal about lead paint. I can easily find the number for the Poison Control Center.
Behavior	I am not sure how mercury ends up in the environment. I know which consumer products potentially contain hazardous materials.
Core Area: Waste and Sanitation	
Knowledge	Many states use recycled wastewater as their drinking water. It is okay to discard used batteries in the garbage.
Attitude	Living near a landfill poses minimal health risks. Businesses should be required to recycle.
Behavior	I know when my city is sponsoring a chemical collection day for items such as paint, oil, and medicines. I throw away aluminum cans.
Core Area: Water	
Knowledge	Flushing unused medications down the toilet is the best way to dispose of them. Most waterborne diseases are caused by improperly managed wastewater treatment plants.
Attitude	Wastewater treatment is an important topic. Individuals or households who contaminate storm drains should be heavily penalized.
Behavior	I run my dishwasher every day. I closely monitor how much water I use.
Core Area: Weather and Climate Change	
Knowledge	Eating beef contributes to the greenhouse effect. Many public places may be exacerbated by climate change.
Attitude	I am concerned about the effects of energy use on the climate. There is very little individuals can do to reduce pollution.
Behavior	I use a tankless water heater. I know my personal carbon footprint.

the purpose of the survey was to “help the public gain knowledge.” The participants in the Florida focus group, however, did not understand the purpose of the survey and had a difficult time answering the questions.

Each group was asked to identify the topics that they considered to be the most important. Participant responses largely reflected the topics included on the questionnaire that they examined and varied based on geographical location. For example, in the Kentucky focus group participants stated

that methamphetamine (meth) prevention was important, as well as carbon monoxide and pest control (e.g., cockroaches). The Florida group stated water conservation was the most important issue, whereas radiation and food preparation were most important for Illinois focus group participants. Due to the geographical location of the focus groups, some questions may or may not have been applicable for these locations. Therefore, diseases including hantavirus pulmonary syndrome (HPS), which is primarily concen-

trated in the southwest U.S., may not be as important to these areas.

Three overarching themes identified included question clarification, applicability, and political perceptions. The first theme of clarification served as an umbrella for codes including the definition of terms, scales, and general question formatting. Participants identified examples of specific terms they found confusing, including: “exacerbate,” “methamphetamine,” “remediate,” and specific diseases including HPS. “Exacerbate” was included with a question on the impact of humans on climate change and was not confusing to all of the participants. Several participants understood what “meth” meant but were confused about “methamphetamine.” One participant stated, “I had never seen the whole word spelled out.” Several survey items discussed the notion of remediation (e.g., for healthy housing issues). A Kentucky participant stated, “I understand that remediation should be done by a specialist, but they don’t know what it means for removal...something else...the word confuses people.”

Another suggested improvement in survey format is the addition of more answer choices. Participants suggested that “do not know” be added to the knowledge section for increased accuracy. One participant stated, “I didn’t want to make an assumption.” Another participant stated, “I don’t think it was the wording of the survey. Our basic knowledge just depends on what we know. With radon, I’ve never really heard much about it all. If I didn’t know about it, that’s the only time I got confused. Like with question number four [on carbon monoxide], I just took a guess.”

General confusion also occurred about the attitude and behavioral scales. The attitude questions used a Likert scale of “strongly agree,” “agree,” “disagree,” and “strongly disagree.” The behavior questions had different scales depending on the context of the question (e.g., yes/no; never/frequently/always). Participants from multiple focus groups felt like their answers were never fully defined by “never,” “frequently,” or “always.” According to a Kentucky participant, “I guess that there were a few that I felt like were not ‘never, frequently, or always’ and I felt like I was somewhere between never and frequently.” Therefore, expanding the scales to incorporate a broader selection of possible answers such as “rarely” and “sometimes” may clarify percep-

tions and frequency of behavior among the target population.

Applicability was a second theme that emerged from the focus groups. This included life circumstances and geographical location of participants. Participants suggested inclusion of a “does not apply” answer choice to accommodate different life circumstances. This was particularly true for items related to healthy homes, because several participants, particularly in the Florida group, were not homeowners. Participants felt forced to select from the available answer choices; therefore, the results may not be indicative of their actual knowledge in that topic area. Alternatively, the final survey could direct people to answer a subset of questions if they own a home or skip to a specified question number if they do not. Another option would be to add a question in the demographics section of the final survey in order to obtain information about whether individuals are homeowners. This would allow for comparing the knowledge of those who do and do not own their own residence and gaining a better understanding of the actual knowledge level of participants about these issues.

Due to the fact that the survey took place in four different geographical locations, participants had a number of comments on question content. This included topics of disease (Rocky Mountain spotted fever and HPS), car dusting, water conservation, and radon. Participants in the Midwest were not as familiar with HPS or Rocky Mountain spotted fever; however, they collectively agreed that these topics were important to know. Similarly, Florida focus group participants thought it was very important for individuals to know or be concerned about water conservation, because it is important for the state of Florida. According to a male participant in the Florida group, “for Florida, water conservation is a big deal. For myself, heavy metals are a big topic for me.” When it came to the topic of radon, some participants were not aware of this issue, even though it was prominent in the area. On this issue one participant stated, “I’m just not sure about radon, I don’t hear much about it.”

The last theme among the focus groups was the notion of political perceptions that many participants thought impacted their answers on the survey. Terms such as “tax dollars,” “government,” “environment,” and

“heavily fined” caused concern among participants from each focus group. According to an Illinois participant, “I thought some of the questions were geared to almost an interpretation and so I wasn’t really sure if this was testing my knowledge of the environment or how much of it was my political slanting.” A Florida participant discussing the term “heavily fined” asked, “How much is heavily? This needs to be defined.” A Missouri participant stated he didn’t know if he wanted to pay more taxes to create a better environment, but a Kentucky participant stated, “We have to be willing to pay for it [environmental changes] too...like part of higher taxes, if we don’t have higher taxes we can’t do it.” Thus, the attitude questions were often viewed politically and terms such as “heavily fined” caused many participants to answer in opposition if it did not go with their political beliefs.

Discussion

A population’s knowledge, attitudes, and behaviors concerning environmental health-related issues impact health literacy and ultimately can decrease the prevalence of disease. Because exposure to environmental hazards has the potential to adversely affect human health, it is vital that individuals take the necessary measures to safeguard themselves from risks (Dixon et al., 2009). Unfortunately, many people are not aware of the impact of environmental risks to their overall well-being. Our study utilized focus groups to improve a survey that was designed to determine the level of knowledge and associated attitudes and behaviors about environmental health. For our study, two objectives were important for the outcome of each focus group: the completion of the survey instrument and the participants’ general interpretation of the instrument.

Overall, participants had difficulty identifying the study purpose. A primary reason for the confusion is the twofold nature of the study: the overall environmental health awareness study, and the focus group purpose to revise the instrument. Participants in the Florida focus group had the most difficulty determining the purpose, likely because only one member of the research team was present and may not have explained the purpose as clearly as when multiple members of the team were present.

Morrone (2001) found that environmental health science education in America is very deficient, which may explain why participants were confused when the correct terminology was used in questions. Because words like “methamphetamine” and “remediation” were used instead of “meth” and “removal,” the reading level may have been too high for the average individual. Thus, inserting the abbreviated, more common term in parentheses may help with clarification of survey questions.

Location-dependent questions, such as HPS, may not be applicable for a generalized environmental health questionnaire. While individuals need to be educated about diseases and topics that have the potential to cause negative health outcomes, it is more important for them to understand issues for which they are at direct risk. Even though many school curricula have begun incorporating environmental health in an effort to increase environmental health literacy (Morrone, 2001; Tempte & McCall, 2001) many people have only been given a broad overview of environmental health or misleading information (Morrone, 2001). Consequently, individuals have difficulty discerning the explicit risks associated with their behavior (Burger & Gochfeld, 2008).

Furthermore, a number of the attitude questions used terms such as “tax dollars” and “government.” According to Baxter (1990), when a person is placed at risk for negative health outcomes due to environmental factors, his or her interest in changing personal behavior significantly increases. Along with this, when people perceive that an increased significant danger imposed by an environmental hazard exists, they tend to expect the government to do more to help reduce the associated risk. The fact that many participants believed the questions were politically slanted may have influenced how they responded. Thus, it was ascertained that some of the questions need to be reworded so that they are more politically neutral.

Our study had limitations. To best elicit individual perspectives, focus groups should be small and fairly homogenous. According to Krueger and Casey (2009), homogeneity ensures similar experiences and viewpoints. The majority of our focus groups were comprised of broad age ranges, potentially allow-

ing one person's views to strongly influence another's during the discussions (Krueger & Casey, 2009; Stewart, Shamdasani, & Rook, 2007). Having several focus groups made up of individuals in the same age bracket in each location would allow for a better understanding of age-biased responses to the survey in each geographical area. Having multiple focus groups at each geographical location, however, was cost prohibitive.

In addition, the recruitment process proved to be difficult. Even though a free meal and a chance to be entered into a raffle to win a \$100 gift card were offered as incentives, many people were not interested in participating. Additionally, some individuals who agreed to take part in the focus groups failed to attend. This may be due to the time lag between recruitment and commencement of the focus group. Many of the participants also brought friends or family members with them. Thus, the groups were not randomly selected but instead were obtained using a snowball technique. Although homogeneous groups are best, those consisting of close friends or relatives are not recommended

because it is possible that their experiences are too comparable and, therefore, they may not have anything new to add to the discussion (Stewart et al., 2007). In addition, a hierarchical effect may occur and one may have a dominant influence over the other (Stewart, et al., 2007).

The fact that the survey had several different sections also complicated matters. The results of the individual focus groups could not be collectively analyzed because each group received a different section of the survey. Survey sections were randomly chosen for each location prior to the commencement of the focus group. Consequently, the results are topic specific and cannot be applied to environmental health in general.

Furthermore, most of the focus groups were conducted in the Midwest. This may have resulted in the results of the study being less generalizable because some of the topics are not of high concern in this area. Likewise, people in this area do not have the same attitudes or behaviors as those living in other locations around the U.S. (Clack, Targonski, & Drabelle, 1997).

Conclusion

Additional improvement and validation of this survey needs to be completed before it is ready for administration to the target population. This will be done by conducting a pilot study using college students at a Midwest university. It is the goal of the researchers that this novel environmental health instrument will be utilized in order to gain a clear picture of the knowledge, attitudes, and behaviors of individuals about environmental health. The information obtained will be used to develop materials for increasing the environmental health literacy of individuals in the U.S. 🌍

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References

- Andresen, E., & Bouldin, E.D. (Eds.). (2010). *Public health foundations: Concepts and practices*. San Francisco: Jossey-Bass.
- Baird, B.N. (1986). Tolerance for environmental health risks: The influence of knowledge, benefits, voluntariness, and environmental attitudes. *Risk Analysis*, 6(4), 425–435.
- Baxter, R.H. (1990). Some public attitudes about health and the environment. *Environmental Health Perspectives*, 86, 261–269.
- Bearer, C.F. (1995). Environmental health hazards: How children are different from adults. *Critical Issues for Children and Youth*, 5(2), 11–26.
- Bianco, A., Nobile, C.G., Gnisci, F., & Pavia, M. (2008). Knowledge and perceptions of the health effects of environmental hazards in the general population in Italy. *International Journal of Hygiene and Environmental Health*, 211(3–4), 412–419.
- Burger, J., & Gochfeld, M. (2008). Knowledge about fish consumption advisories: A risk communication failure within a university population. *Science of the Total Environment*, 390(2–3), 346–354.
- Chepesiuk, R. (2007). Environmental literacy: Knowledge for a healthier public. *Environmental Health Perspectives*, 115(10), 494–499.
- Clack, G., Targonski, R., & Drabelle, D. (Eds.). (1997). *Portrait of the USA*. Washington, DC: United States Information Agency.
- Dixon, J.K., Hendrickson, K.C., Ercolano, E., Quackenbush, R., & Dixon, J. (2009). The environmental health engagement profile: What people think and do about environmental health. *Public Health Nursing*, 16(5), 460–473.
- Dunlap, R.E., & Van Liere, K.D. (1978). The new environmental paradigm: A proposed measuring instrument and preliminary results. *Journal of Environmental Education*, 9(4), 10–19.
- Howe, H.L. (1990). Predicting public concern regarding the toxic substances in the environment. *Environmental Health Perspectives*, 87, 275–281.
- Krueger, R.A., & Casey, M.A. (2009). *Focus groups: A practical guide for applied research* (4th ed.). Thousand Oaks, CA: Sage.
- Lobdell, D.T., Gilboa, S., Mendola, P., & Hesse, B.W. (2005). Use of focus groups for the environmental health researcher. *Journal of Environmental Health*, 67(9), 36–42.
- Maibach, E.W., & Cotton, D. (1995). A staged social cognitive approach to message design. In E.W. Maibach & R.L. Parrott (Eds.), *Designing health messages: Approaches from communication theory and public health* (pp. 41–64). Thousand Oaks, CA: Sage.
- Morrone, M. (2001). Primary and secondary school environmental health science education and the education crisis: A survey of science teachers in Ohio. *Journal of Environmental Health*, 63(9), 26–30.

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References *continued from page 27*

- Ratnapradipa, D., Brown, S.J., Middleton, W.K., & Wodika, A.B. (2011). Measuring environmental health perception among college students. *The Health Educator*, 43(2), 13–20.
- Ratnapradipa, D., Brown, S.J., & Wodika, A.B. (2011). Examining the breadth and depth of environmental health through a modified Delphi technique. *American Journal of Health Education*, 42(1), 50–57.
- Scammell, M.K. (2010). Qualitative environmental health research: An analysis of the literature, 1991–2008. *Environmental Health Perspectives*, 118(8), 1146–1154.
- Scott, D., & Willits, F.K. (1994). Environmental attitudes and behavior. *Environment and Behavior*, 26(2), 239–260.
- Stewart, D.W., Shamdasani, P.N., & Rook, D.W. (Eds.). (2007). *Focus groups: Theory and practice*. Thousand Oaks, CA: Sage.
- Tempte, J.L., & McCall, J.C. (2001). Patient attitudes toward issues of environmental health. *Wilderness and Environmental Medicine*, 12(2), 86–92.
- Weigel, R., & Weigel, J. (1978). Environmental concern: The development of measure. *Environment and Behavior*, 10(1), 3–15.
- World Health Organization. (2002). *The world health report 2002: Reducing risks, promoting healthy life*. Retrieved from <http://www.who.int/whr/2002/en/>
- World Health Organization. (2011). *Environmental health*. Retrieved from http://www.who.int/topics/environmental_health/en/

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► BUILDING CAPACITY



Darryl Booth, MBA

Analytics Build Capacity for Health Departments Combatting Rodent Infestations

Editor's Note: A need exists within environmental health agencies to increase their capacity to perform in an environment of diminishing resources. With limited resources and increasing demands, we need to seek new approaches to the business of environmental health.

Acutely aware of these challenges, NEHA has initiated a partnership with Decade Software Company called *Building Capacity*. *Building Capacity* is a joint effort to educate, reinforce, and build upon successes within the profession, using technology to improve efficiency and extend the impact of environmental health agencies.

The *Journal* is pleased to publish this bimonthly column from Decade Software Company that will provide readers with insight into the *Building Capacity* initiative, as well as be a conduit for fostering the capacity building of environmental health agencies across the country.

The conclusions of this column are those of the author(s) and do not necessarily represent the views of NEHA.

Darryl Booth is president of Decade Software Company and has been monitoring regulatory and data tracking needs of agencies across the U.S. for 18 years. He serves as technical advisor to NEHA's technology section, which includes computers, software, GIS, and management applications.

Analytics, the computational analysis of data, have made their way into our daily lives. Common apps exist that track our dietary choices, our running routes, even our sleep. With real-time information about things that are important to us, we can make changes—behavioral or environmental changes targeted at improving those data. Consider the popular Fitbit, an inexpensive device worn as a wristband, which feeds continuous streams of data to an online repository where they are crunched, compiled, and

presented as easy-to-read graphs, serving as a competitive “nudge” by pitting you against yourself or your friends.

This personal concept of a “quantified self” is relevant and even more compelling at a larger scale, as business analytics. And so it is perfectly appropriate to examine municipal analytics as a means to build capacity. Utilizing analytics, health departments can better guide their decision-making procedures and be more open and transparent with their citizens.

Health departments already collect vast quantities of data by virtue of their regular business services; for example, data produced by 311 requests. In what ways do local governments further utilize this data after an initial work order is closed? In this column, I discuss how health departments have successfully employed targeted analytics to be more efficient and effective in managing rodent baiting activities.

We all acknowledge that rodents are a public health concern, particularly in urban areas. Cities such as Chicago, Illinois, and Somerville, Massachusetts, are now effectively using 311 data and predictive analytics to track rodent activity and guide their treatment efforts.

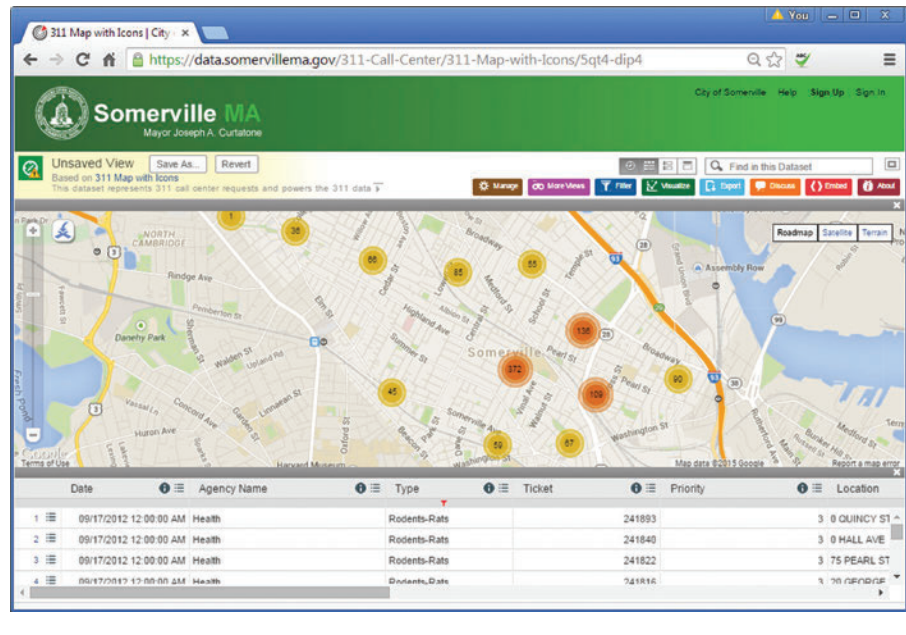
Previously, Chicago's preventative rodent control procedures, beyond responding to individual 311 calls for private and public locations, was limited to proactively baiting locations that were known to be prone to infestation (e.g., a cluster of restaurants).

Through a partnership between the Department of Streets and Sanitation (DSS) and the Department of Innovation and Technology (DoIT), Chicago launched a pilot automated preventative rodent baiting program in October 2013. The program models data captured by the city's 311 service and analyzes 31 different service request data points, such as abandoned buildings, weed complaints, stray animals, or overflowing trash cans to guide the timing and location of preventative baiting services. Based on this information, the data forecasts potential rodent activity and automatically generates a baiting schedule.

The pilot program has since been fully adopted. “What we noticed after six months

FIGURE 1

Example of Somerville's "Heat Map" Created From 311 Call Data



of half our teams using the automated model and the other half following our regular procedure,” says Molly Poppe, spokesperson for DSS, “is that the automated model was boosting personnel efficiency by 20%. Supervisors and crews used to have to come in and spend at least an hour every morning in planning, saying, ‘Ok, we were in this neighborhood, and we noticed these issues, this might start to become a problem, so let’s get people out there.’ The automated model saves us that planning time, and allows us to have crews out on the streets faster and longer. Rather than reacting to infestations, we are able to get out ahead of them.”

Through this program, DSS became so effective that they were trusted by their city council to expand the program and add more teams.

Chicago is a big city with many resources, but analytics are not out of reach for smaller municipalities. Somerville, an urban satellite of Boston with a population of 80,000 residents, offers a compelling perspective on the smaller version of municipal analytics. Another city that has fully embraced data, Somerville employs analysts to use data to inform decision making and implement new ideas (www.somervillema.gov/departments/somerstat).

Somerville launched an aggressive approach to its rodent problem via a 311 data-based rodent abatement program and extensive community outreach, prompted in part by a surge in rodent complaints. In 2012 a record number of rodent complaints occurred: 698 reported sightings, compared with 282 sightings just two years earlier. Denise Taylor, director of communications, notes that communities across the region experienced a similar increase. But, she says, Somerville is different. “Everybody has rats—what’s different is we have rat data and we have a rat plan.”

Somerville established the rodent action team (appropriately acronym-ed RAT), which uses 311 call data to create “heat maps” showing where rodent complaints are being made (Figure 1). The 311 data is exported and manipulated using commercially available statistical software with mapping functionalities. The team then investigates, analyzing other data sets and trends to determine what factors might be causing or contributing to rodent outbreaks. Based on these insights, Somerville’s Inspectional Services Department (ISD) knows where and when to respond and can do preventative work.

“With any mobile biological vector, of course, it can be difficult to get clear data on

where the rats actually are,” says Ellen Collins, operations manager for ISD. “We bait catch basins, which is pretty standard practice. But when we started tracking reinspection data, we found that though the calls continued to come in, the bait tended to not be disturbed. As we are a mostly residential city, this was the evidence we used to dedicate more resources towards addressing residential waste, which is a rodent food source.”

With support from the mayor and city government, Somerville started a financial assistance residential program in 2014 allowing one-time inspections and education for qualifying residents. The city also distributed waste bins with attached lids. “The idea was that rats won’t go into a sewer to eat bait if there’s food in your garbage or rotting fruit from your tree in your backyard,” explains Taylor. “We knew based on the data that we weren’t getting to them through the sewers and we knew people with private property either didn’t know how to reduce food sources or couldn’t afford private exterminators. The residential program allowed us to get to those properties where we knew we could be more effective, rather than bait the sewer where we knew they weren’t going.”

Between the summers of 2013 and 2014, a 41% decrease in calls occurred, compared to only a 2.7% decline from 2012 and 2013. “It was a colder winter, so we can’t say definitively that it was all due to our measures, but it’s such a large decrease that we feel quite positive,” says Collins. “These data are incredibly useful; they help us identify the problem, help us in our decision making, and over time they will help us determine if we’ve actually taken the right steps to address it. Without the data at any of those steps, I think that we would have had a much tougher time making and evaluating our decisions.”

Predictive analytics have many applications in the public sphere, as well as many challenges. Though at its most basic the metrics are generally the same across the country (the number of rodent calls locals make) opportunity exists for incongruity. That’s why Somerville is currently developing data standards with the neighboring cities of Cambridge and Boston to ensure the highest level of data accuracy.

“It’s very helpful when other cities are working on the same datasets and sharing them,” notes Taylor. “Comparing to other cities, espe-

cially cities with similar weather patterns, is helpful in our analysis of what the overarching issues may be and if our programs are having an impact. Recently we've seen our data shift away from the pattern in Boston in particular, and it coincides with some of the measures we've been taking, potentially proving that beyond variables outside of our control, like weather, we are having an impact."

Constituents expect a high degree of transparency and efficiency, and technology application is rising to meet the occasion. Budgets

are still tight, but right-minded collaboration with internal technology and innovation departments as well as with other health departments can foster high-impact and low-cost results. By using health data in innovative ways, health agencies can be not only more efficient in their practices, but also more precise in how they strategize, allocate funding, or make requests of governing entities. I am especially drawn to this concept simply because agencies naturally collect these types of data every day.

Let's continue this conversation. Tell us how municipal analytics have benefitted you at <http://tinyurl.com/DiscussAnalytics>.

If you are interested in pursuing a project like this, find more resources at www.decadesoftware.com/Column. 🐼

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An Introduction and History of the American Academy of Sanitarians



Editor's Note: In an effort to provide environmental health professionals with relevant information and tools to further the profession, their careers, and themselves, NEHA has teamed up with the American Academy of Sanitarians (AAS) to publish three columns a year in the *Journal*. AAS is an organization that “elevates the standards, improves the practice, advances the professional proficiency, and promotes the highest levels of ethical conduct among professional sanitarians in every field of environmental health.” Membership with AAS is based upon meeting certain high standards and criteria, and AAS members represent a prestigious list of environmental health professionals from across the country.

Through the column, information from different AAS members who are subject-matter experts with knowledge and experience in a multitude of environmental health topics will be presented to the *Journal's* readership. This column strengthens the ties between both associations in the shared purposes of furthering and enhancing the environmental health profession.

Robert W. Powitz received his undergraduate degree from the University of Georgia and his MPH and PhD from the University of Minnesota. He is currently a forensic sanitarian in private practice and part-time health director in Franklin and Lebanon, Connecticut.

The American Academy of Sanitarians (AAS) is an organization that elevates the standards of the sanitarian profession, improves the practice, advances professional proficiency, and promotes the highest levels of ethical conduct among its members in every field of environmental health.

The primary purpose of AAS is to enhance professional recognition. In doing so, its aim is to improve the applied sciences that

encompass environmental health through certification and educational initiatives. AAS recognizes those sanitarians who excel in their chosen vocation and who demonstrate exceptional knowledge, skills, and attributes as professionals in government, academia, the uniformed services, and in industry. AAS actively promotes education through its professional advancement and its commitment to scholarship and mentoring.

A Bit of History

The Civil War transformed the sanitarian movement from the polemic prose of Victorian sages to real vocational efforts dedicated to protecting the public's health. In the decade following the turn of the 20th century, several states enacted licensure programs for health (aka sanitary) inspectors to ensure competency in the interpretation of environmental and public health regulations. Following World War II, the sanitarian's role expanded even further with the growth of the economy and global commerce. As a profession, we applied new concepts in the environmental sciences to institutions, industry, and other governmental programs tangential to our traditional role of community code enforcement. Through our work in the regulatory arena and together with our collective knowledge, skills, and attributes acquired through experience and continuing research, our profession became known for its expertise in contamination and infection control. Employers started seeking competency not only through a credentialing program, but also through the demonstration of communication, management skills, and academic accomplishment. The professional designation of “sanitarian” truly came of age by midcentury.

AAS began in November 1956, when the Sanitarians Joint Council (SJC) held an organizational meeting at the American Public Health Association (APHA) Convention in Atlantic City, New Jersey. The professionals who made up the SJC were representatives from three associations whose membership embraced the majority of sanitarians at that

time. These organizations were APHA; the International Association of Milk, Food, and Environmental Sanitarians, later called the International Association for Food Protection; and the National Association of Sanitarians, which became the National Environmental Health Association.

The meeting of the SJC resulted in a charter dated November 14, 1956. The original charter had five basic objectives:

1. to develop a uniform definition for “sanitarian”;
2. to promote the professional status of the sanitarian;
3. to develop a Sanitarian Specialty Board;
4. to draft a recommended uniform law for the registration of sanitarians; and
5. the development and promotion for the educational requirements and other qualifications for the sanitarian profession.

In July 1961 the SJC completed the basics of the original objectives as well as a plan for the certification of sanitarians. The recommendations, known as the “Proposed Model Act,” were subsequently accepted by all SJC members. It was published in the affiliated journals and distributed widely to as many political jurisdictions as possible.

With the completion of the “Proposed Model Act,” an updated definition of sanitarian and the acceptance of a Sanitarian Specialty Board, the council created the American Inter-Society Board for the Certification of Sanitarians on October 5, 1964. On October 20, 1965, the board changed the name of the organization to the American Intersociety Academy for the Certification of Sanitarians (AIACS) to reflect its expanded involvement in the profession. The academy was formally incorporated in the state of Indiana on March 14, 1966.

Financial assistance for the newly formed academy came from the three founding organizations that made up the original SJC. Each organization gave the academy a \$1,000 interest-free loan that was paid back in a little over two years.

The 12 original founding members of the newly formed academy board were Harold S. Adams, A. Harry Bliss, Emil T. Chanlett, E.E. Diddams, B. Russell Franklin, Larry J. Gordon, William V. Hickey, William C. Miller, Jr., A. Faegin Parrish, Verne C. Reierston, Edwin L. Ruppert, and Darold W. Taylor.

The designation of “Diplomate” was incorporated into the bylaws for those pro-

fessionals who had at least 12 years experience as a sanitarian, five of which were in an administrative or supervisory position, and who met all the other membership requirements. In 1975 the AIACS underwent yet another name change for simplicity and for ease of recognition as a professional group. The name “American Academy of Sanitarians” was adopted.

Today’s Association

AAS invites and encourages sanitarians with qualities of outstanding competence and leadership to become certified as a Diplomate. Certification as a Diplomate is awarded only after careful scrutiny of the applicant by a board of his or her peers. The certification process is quite unique. It differentiates a professional sanitarian who is registered by examination and one who is qualified under demanding standards such as academic achievement, publication, community participation and leadership, credentialing in allied environmental health sciences, and demonstration of leadership in the workplace. Becoming a Diplomate in AAS denotes achievement of a high standard of professionalism with marked distinction, and testifies to a record of accomplishment in the field of environmental health. It bestows professional status and gives prestige to the holders of the Diplomate certification. Since its inception, over 585 professional sanitarians were awarded Diplomate status in AAS.

In 1999, AAS created the certification of a Diplomate Laureate to recognize Diplomates who have demonstrated exceptional professional growth, accomplishment, and leadership in the sanitarian profession. The Laureate must demonstrate longevity in the profession in addition to meeting six additional criteria that include extraordinary accomplishments in the field of environmental health and the professional practice as a sanitarian.

The Academy also awards Diplomate Emeritus certification to those Diplomates who have retired after an exceptional career, and the title of Honorary Diplomate is conferred upon those individuals who have advanced the sanitarian profession and the field of public health but are not sanitarians themselves. AAS has eight laureate, 12 emeritus, and five honorary members.

Awards

In 1981 AAS initiated its Davis Calvin Wagner Sanitarian Award. This is an annual award to recognize a Diplomate sanitarian who has attained a status of distinction as a professional. The award is made possible through the devotion and generosity of Assistant Surgeon General (Ret.) Carruth J. Wagner, MD, U.S. Public Health Service, in memory of his brother. It reflects Dr. Wagner’s respect and admiration for the professional sanitarian. To date, 25 Diplomates are recipients of this honor.

In addition to individual recognition, AAS is both a participant and cosponsor of the Samuel J. Crumbine Award. The Crumbine Award, given by the Conference for Food Protection, is awarded annually to a local environmental health jurisdiction that demonstrates excellence and continual improvement in a comprehensive food protection program. The purpose of the award is to encourage improvement and stimulate public interest in foodservice sanitation. The award is named in honor of Dr. Samuel J. Crumbine (1862–1954), a sanitarian-physician and public health pioneer who was renowned for his innovative methods of improving disease prevention through public health initiatives.

To Learn More

We encourage everyone to visit our Web site: www.sanitarians.org. In addition to a listing of the professionals awarded the Diplomate status and qualifications for membership, it also has an archive that contains a unique collection of member publications, presentations, papers, and videos from not only those who created the modern practice of environmental health, but those who continue to revitalize and improve its service to mankind. In addition, the site offers an extremely valuable scientific vocabulary dictionary that provides Latin and Greek word roots, as well as a comprehensive and fascinating history of the U.S. Public Health Service originally published in 1923. 🐼

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Sharing Environmental Health Services Across Jurisdictional Boundaries

Gianfranco Pezzino, MPH, MD
Liza C. Corso, MPA
Robert G. Blake, MPH, REHS
Patrick Libbey

Editor's Note: NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health. EHSB's objective is to strengthen the role of state, local, tribal, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health.

The conclusions in this article are those of the author(s) and do not necessarily represent the views of CDC.

Gianfranco Pezzino is co-director of the Center for Sharing Public Health Services based at the Kansas Health Institute. Liza C. Corso is senior advisor for Public Health Practice and Accreditation in the Division of Public Health Performance Improvement at the CDC Office for State, Tribal, Local, and Territorial Support. Robert G. Blake is a health scientist with the EHSB at CDC's Division of Emergency and Environmental Health Services. Patrick Libbey is co-director of the Center for Sharing Public Health Services.

Environmental health is a critical component of governmental public health, as provided in state, tribal, local, and territorial jurisdictions. The environmental health services provided by each health department can vary; common examples include the following:

- inspecting food establishments,
- monitoring the quality of drinking and recreational water,
- managing solid and liquid waste,

- performing vector control, and
- inspecting buildings to assure compliance with environmental codes.

Difficulty in finding qualified personnel (especially in small jurisdictions) coupled with challenges in paying for the cost of providing the desired services have been important drivers for health departments to explore alternative options. One of these options is cross-jurisdictional sharing (CJS) (Madamala et al., 2014).

Cross-jurisdictional sharing enables collaboration across jurisdictional boundaries to deliver essential public health services (Center for Sharing Public Health Services, 2015). Sharing models range from informal agreements limited in scope to full consolidation of local health department agencies (Figure 1).

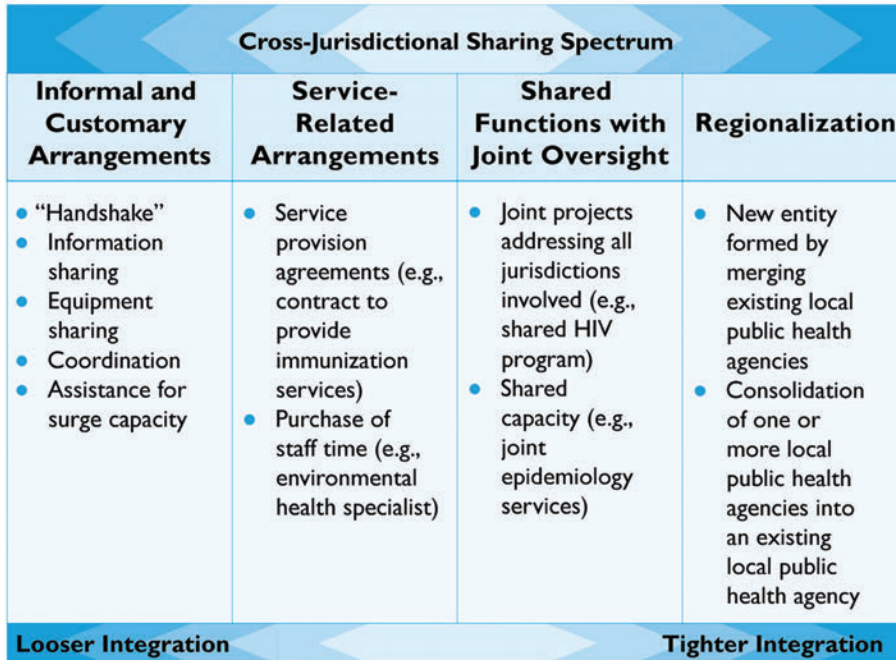
These approaches can provide more value for investments in public health by allowing economy of scale and expansion of public health services in some areas that otherwise might not be economically feasible. Sharing agreements can also help attract skilled, qualified personnel who may be reluctant to operate only in a small jurisdiction. Sharing services can help health departments improve both effectiveness (i.e., scope and quality of services offered) and efficiency (i.e., maximum results for each dollar invested).

In 2012, the Robert Wood Johnson Foundation provided funding to the Kansas Health Institute to establish and manage a national Center for Sharing Public Health Services (www.phsharing.org). The center collected and reviewed published information and collected new evidence from 16 demonstration sites to develop a model to plan and implement sharing agreements that health departments can use. This roadmap includes multiple steps divided into three phases (Figure 2). In every phase of the model, it is necessary to obtain the support of policy makers and governing bodies that often have the ultimate authority to finalize the sharing agreements.

The Centers for Disease Control and Prevention (CDC) also has expressed interest in CJS as an opportunity for health departments to address resource constraints while providing quality services to communities. In 2012,

FIGURE 1

Spectrum of Cross-Jurisdictional Sharing Activities



Source: Center for Sharing Public Health Services, 2015.

FIGURE 2

Development Phases for Cross-Jurisdictional Sharing (CJS) Agreements



Source: Center for Sharing Public Health Services, 2015.

the advisory committee to the CDC director recommended that CDC explore and foster opportunities for shared services. As a result, CDC identified numerous opportunities and strategies to support CJS, all of which can be relevant for environmental health (www.cdc.gov/stltpublichealth/cjs). Examples include the following:

- Creating funding opportunity announcements that promote or allow for shared services. As a result, some states built lead control programs with staffing and program infrastructures shared by state and local agencies.
- Advancing interjurisdictional sharing around discrete activities or services.

Many public health laboratories are collaborating across jurisdictions by making arrangements to share test services or provide surge capacity (Association of Public Health Laboratories & Centers for Disease Control and Prevention, 2014).

- Supporting shared services through tools, training, or peer sharing. For example, the Healthy Community Design Initiative promotes processes, such as health impact assessment, to help health departments facilitate health and planning collaboration across jurisdiction lines.

Several examples highlight successful CJS initiatives in the area of environmental health services:

- In the geographically isolated San Luis Valley, Colorado, six county health departments agreed to share most environmental health services, including the first-ever environmental health needs assessment for the area. The counties now share ongoing environmental health services that they otherwise could not have procured easily on their own. One county serves as the fiscal agent and employer of a new, shared environmental health position with oversight from the health officials of the participating jurisdictions.
- In Nevada, Carson City and neighboring Douglas County reached an agreement through which environmental health services formerly provided by the state in Douglas County are now provided by Carson City staff. Through an interlocal agreement (<http://phsharing.org/2014/04/10/interlocal-contract-between-public-agencies-carson-city-douglas-county-nevada/>), Carson City health department staff was given authority to enforce provisions of the environmental health code approved by the Douglas County commission.
- In Wisconsin, three county health departments formed an environmental health consortium to provide services across jurisdictions. One county serves as the fiscal agent and employer of environmental health staff for the consortium. The arrangement improved both efficiency and effectiveness of environmental health services while improving local accountability and accessibility.
- In western New York, two county health departments now share an environmental health director and staff across the two counties, resulting in improved ser-

vice efficiency and effectiveness for both departments.

Environmental health services are good candidates for CJS projects. These services are usually fee funded, which makes cost sharing easier to compute; they require skilled workers or contractors, who are more easily accessible through sharing agreements; and the volume or type of demand for some environmental health services may be too low and episodic for a single health department to justify the investment required to offer those services. Cross-jurisdictional sharing is of growing interest to public health and

its value for environmental health services is particularly promising. 🚗

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References

Association of Public Health Laboratories, & Centers for Disease Control and Prevention. (2014). *Policy guide for public health laboratory test service sharing*. Retrieved from http://www.aphl.org/AboutAPHL/publications/Documents/LEI-Policy-Guide_April2014.pdf

Center for Sharing Public Health Services. (2015). *Common questions*. Retrieved from <http://phsharing.org/what-we-do/common-questions/>

Madamala, K., Young, N., Young, D., Giese, L., Brandenburg, T., & Zahner, S. (2014). Current and planned shared service arrangements in Wisconsin local and tribal health departments. *Journal of Public Health Management and Practice*, 20(6), 640–646.

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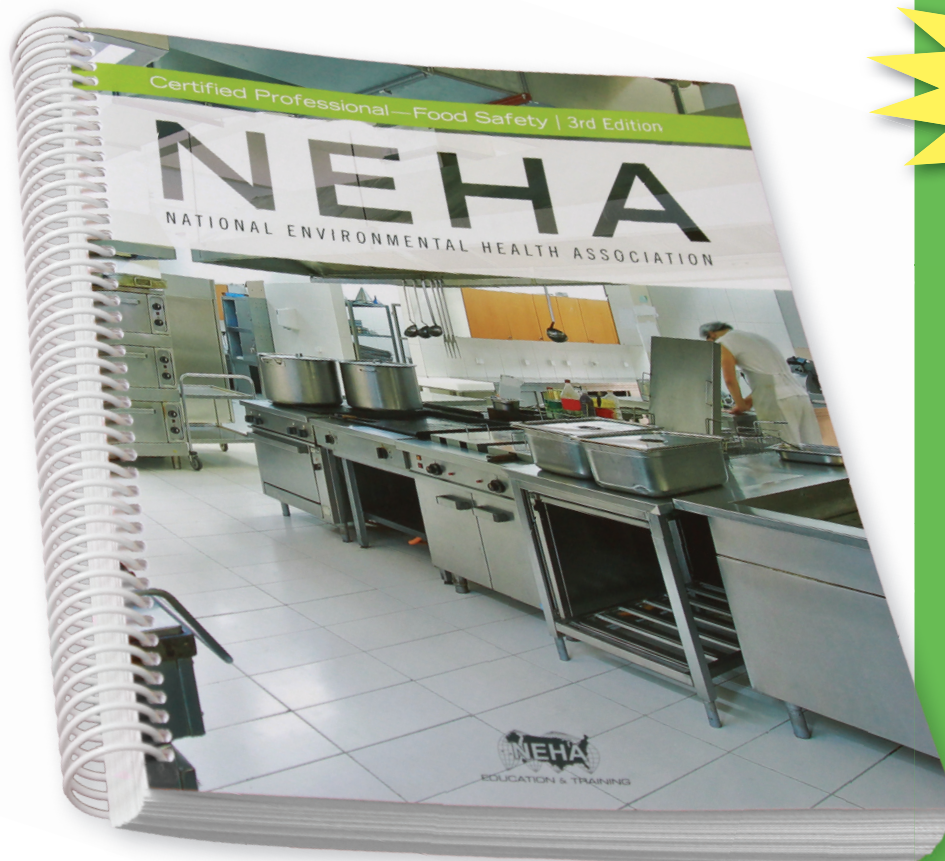
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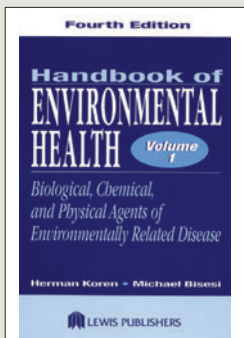
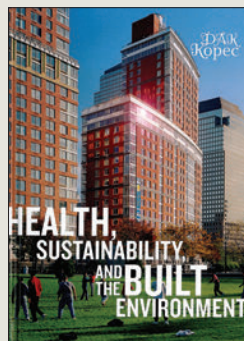
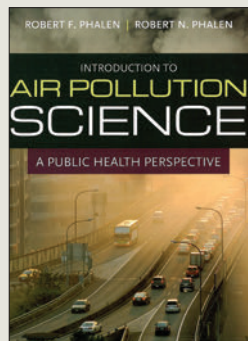
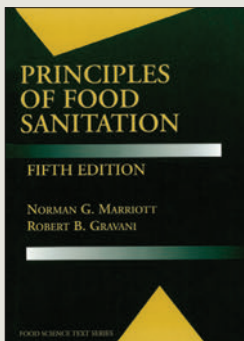
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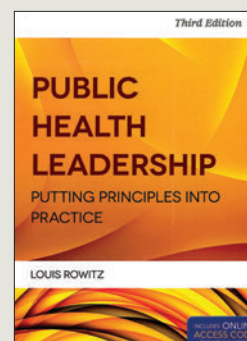
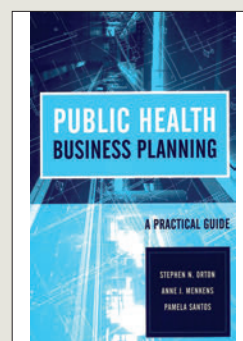
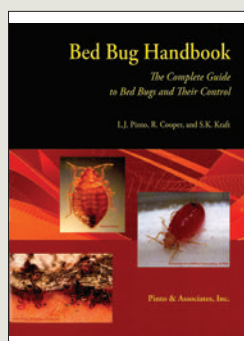
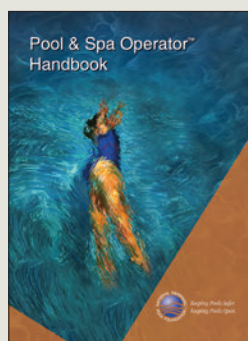
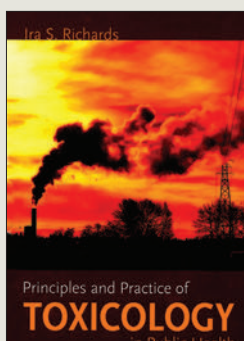
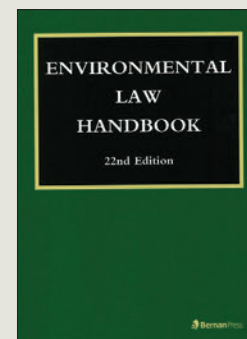
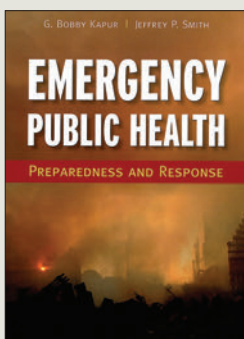
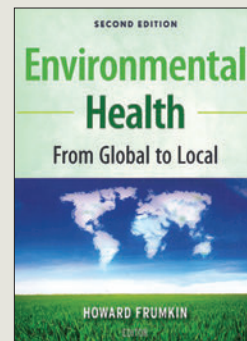
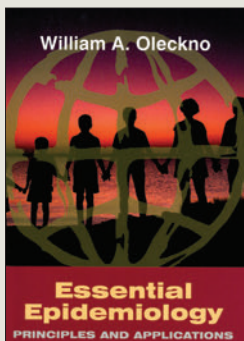
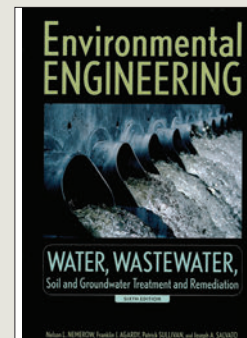
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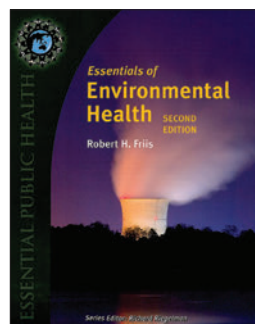
injuries. Also emphasizing a wide variety of issues of global interest, the thoroughly revised second edition contains updated information on such timely topics as toxicology, exposure assessment, climate change, population pressure, developing nations and urbanization, energy production, building and community design, solid and hazardous waste, and disaster preparedness.

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Robert H. Friis (2010)



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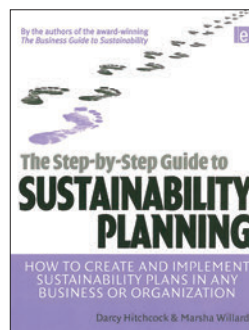
(water and air quality, food safety, waste disposal, and occupational health). The second edition is a thorough revision that includes new material such as a chapter on injuries, an expanded discussion of the history of environmental health, a case study on pandemic influenza (H1N1) in 2009, and coverage of environmental controversies.

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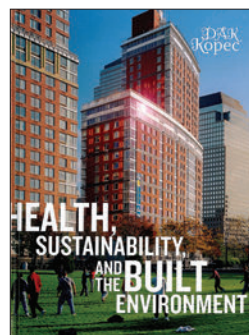
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Indiana

April 16, 2015: Annual Spring Educational Conference, hosted by the Indiana Environmental Health Association, Indianapolis, IN. For more information, visit www.iehaind.org.

Kentucky

July 29–31, 2015: 69th Annual Interstate Environmental Health Seminar, hosted by the Kentucky Association of Milk, Food, and Environmental Sanitarians, Corbin, KY. For more information, visit www.wvdhhr.org/wvas/IEHS/index.asp.

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May 13–15, 2015: Annual Spring Conference, hosted by the Minnesota Environmental Health Association, Alexandria, MN. For more information, visit www.mehaonline.org.

Ohio

April 23–24, 2015: Annual Education Conference, hosted by the Ohio Environmental Health Association, Dublin, OH. For more information, visit www.ohioeha.org.

Utah

May 13–15, 2015: Spring Conference, hosted by the Utah Environmental Health Association, Bicknell, UT. For more information, visit www.ueha.org/events.html.

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Wisconsin

April 21, 2015: Spring Education Conference, hosted by the Wisconsin Environmental Health Association, Oshkosh, WI. For more information, visit www.weha.net/professional-development.php.

TOPICAL LISTING

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April 23–24, 2015: FDA National Kick-Off Meeting on Implementation of the Food Safety Modernization Act (FSMA), Washington, DC. For more information, visit www.fda.gov/FSMA.

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| <input type="radio"/> Delegate Club (\$25) | <input type="radio"/> Affiliates Club (\$2,500) | <input type="radio"/> Visionary Society (\$50,000) |
| <input type="radio"/> Honorary Members Club (\$100) | <input type="radio"/> Executive Club (\$5,000) | <input type="radio"/> Futurists Society (\$100,000) |
| <input type="radio"/> 21st Century Club (\$500) | <input type="radio"/> President's Club (\$10,000) | <input type="radio"/> You have my permission to disclose the fact and amount (by category) of my contribution and pledge. |
| <input type="radio"/> Sustaining Members Club (\$1,000) | <input type="radio"/> Endowment Trustee Society (\$25,000) | |

I plan to make annual contributions to attain the club level of _____ over the next _____ years.

Signature _____ Print Name _____

Organization _____ Phone _____

Street Address _____ City _____ State _____ Zip _____

Enclosed is my check in the amount of \$ _____ payable to **NEHA Endowment Foundation**.

Please bill my: MasterCard/Visa Card # _____ Exp. Date _____

Signature _____

MAIL TO: NEHA, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246, or FAX to: 303.691.9490.

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SPECIAL NEHA MEMBERS

Sustaining Members

Advanced Drainage Systems
www.ads-pipe.com

Advanced Fresh Concepts Corp.
www.afcsushi.com

AIB International
www.aibonline.org

Albuquerque Environmental Health Department
www.cabq.gov/environmentalhealth

Allegheny County Health Department
www.county.allegheny.pa.us

American Academy of Sanitarians (AAS)
www.sanitarians.org

Anua
www.anua-us.com

Ashland-Boyd County Health
hollyj.west@ky.gov

Association of Environmental Health Academic Programs
www.aehap.org

ATSDR/DCHI
www.atsdr.cdc.gov/hac

Camelot International Health Organization
www.camelot.gr

CDP, Inc.
www.cdpehs.com

Chemstar Corporation
www.chemstarcorp.com

Chesapeake Health Department
www.vdh.state.va.us/lhd/chesapeake

City of Bloomington
www.ci.bloomington.mn.us

City of Fall River Health & Human Services
(508) 324-2410

City of Houston Environmental Health
www.houstontx.gov/health/environmental-health

City of Milwaukee Health Department, Consumer Environmental Health
http://city.milwaukee.gov/Health

City of San Diego Environmental Services Department
www.sandiego.gov/environmental-services

City of St. Louis Department of Health
www.stlouis-mo.gov/government/departments/health

Coconino County Public Health
www.coconino.az.gov

Colorado Department of Public Health and Environment, Division of Environmental Health, Delegated Programs Unit
therese.pilonetti@state.co.us

Decade Software Company, LLC
www.decadesoftware.com

DEH Child Care
www.denvergov.org/DEH

DeltaTrak, Inc.
www.deltatrak.com

Digital Health Department, Inc.
www.dhdinspections.com

Diversey, Inc.
www.diversey.com

DuPage County Health Department
www.dupagehealth.org

Eastern Idaho Public Health District
www.phd7.idaho.gov

Ecobeco
www.ecobeco.com

Ecolab
www.ecolab.com

EcoSure
charlesa.arnold@ecolab.com

Elite Food Safety Training
www.elitefoodsafety.com

English Sewage Disposal, Inc.
(756) 358-4771

Erie County Department of Health
www2.erie.gov/health

Florida Department of Health
www.doh.state.fl.us

GLO GERM/Food Safety First
www.glogerm.com

HealthSpace USA Inc.
www.healthspace.com

Industrial Test Systems, Inc.
www.sensafe.com

Inspect2Go
www.inspect2go.com

International Association of Plumbing and Mechanical Officials
www.iapmo.org

ITW PRO Brands
http://itwprofessionalbrands.com

Jackson County Environmental Health
www.jacksongov.org/EH

Jefferson County Health Department (Missouri)
www.jeffcohealth.org

Jefferson County Public Health (Colorado)
http://jeffco.us/health

Kansas Department of Health & Environmental
jrheads@kdheks.gov

Linn County Public Health
health@linncounty.org

Maricopa County Environmental Services
jkolman@mail.maricopa.gov

Mars Air Doors
www.marsair.com

McDonough County Health Department
www.mchdept.com

Merced County Public Health, Division of Environmental Health
rrowe@co.merced.ca.us

Mesothelioma Lawyer Center
www.mesotheliomalawyercenter.org

mesotheliomalawyers.com
www.mesotheliomalawyers.com

Mid-Iowa Community Action
www.micaonline.org

Mitchell Humphrey
www.mitchellhumphrey.com

Mycometer
www.mycometer.com

National Environmental Health Science and Protection Accreditation Council
www.ehacoffice.org

National Registry of Food Safety Professionals
www.nrfsp.com

National Restaurant Association
www.restaurant.org

National Swimming Pool Foundation
www.nspf.org

Neogen Corporation
www.neogen.com

New Mexico Environment Department
www.nmenv.state.nm.us

New York City Department of Health & Mental Hygiene
www.nyc.gov/health

North Bay Parry Sound District Health Unit
www.healthunit.biz

Nova Scotia Department of Agriculture
www.gov.ns.ca

NSF International
www.nsf.org

Omaha Healthy Kids Alliance
www.omahahealthykids.org

Oneida Indian Tribe of Wisconsin
www.oneidanation.org

Orkin
www.orkincommercial.com

Ozark River Hygienic Hand-Wash Station
www.ozarkriver.com

PerkinElmer, Inc.
www.perkinelmer.com

Polk County Public Works
www.polkcountyiowa.gov/publicworks

Presby Environmental, Inc.
www.presbyenvironmental.com

Procter & Gamble Co.
www.pg.com

Prometric
www.prometric.com

QuantEM Food Safety Laboratories
www.quantemfood.com

Racine City Department of Health
www.cityofracine.org/Health.aspx

Remco Products
www.remcoproducts.com

Sacramento County Environmental Management Department
www.emd.saccounty.net

San Jamar
www.sanjamar.com

Seattle & King County Public Health
michelle.pederson@kingcounty.gov

Shat-R-Shield Inc.
www.shat-r-shield.com

Skillsoft
www.skillsoft.com

Sonoma County Permit and Resource Management Department, Wells and Septic Section
www.sonoma-county.org/prmd

Starbucks Coffee Company
www.starbucks.com

Stater Brothers Market
www.staterbros.com

Sweeps Software, Inc.
www.sweepssoftware.com

Target Corp.
www.target.com

Taylor Technologies, Inc.
www.taylortechnologies.com

Texas Roadhouse
www.texasroadhouse.com

The Steritech Group, Inc.
www.steritech.com

Tri-County Health Department
www.tchd.org

Underwriters Laboratories, Inc.
www.ul.com

Waco-McLennan County Public Health District
http://waco-texas/cms-healthdepartment/

Washington County Environmental Health (Oregon)
www.co.washington.or.us/HHS/EnvironmentalHealth

Waukesha County Public Health Division
sward@waukeshacounty.gov

Winn-Dixie Stores, Inc.
www.winn-dixie.com

WVDHHR Office of Environmental Health Services
www.wvdhhr.org

Educational Institution Members

American Public University
www.StudyatAPU.com/NEHA

East Tennessee State University, DEH
www.etsu.edu

Eastern Kentucky University
http://eh.eku.edu

Georgia State University
cstauber@gsu.edu

Michigan State University, Online Master of Science in Food Safety
www.online.foodsafety.msu.edu

Ponce School of Medicine, Public Health Program
www.psm.edu/php

The University of Findlay
www.findlay.edu

University of Illinois Springfield
www.uis.edu/publichealth

University of Wisconsin-Stout, College of Science, Technology, Engineering, and Mathematics
www.uwstout.edu

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2015 Walter F. Snyder Award

Call for Nominations

Nomination deadline is April 30, 2015.

Given in honor of NSF International's co-founder and first executive director, the *Walter F. Snyder Award* recognizes outstanding leadership in public health and environmental health protection. The annual award is presented jointly by NSF International and the National Environmental Health Association.



Nominations for the 2015 *Walter F. Snyder Award* are being accepted for professionals achieving peer recognition for:

- outstanding accomplishments in environmental and public health protection,
 - notable contributions to protection of environment and quality of life,
- demonstrated capacity to work with all interests in solving environmental health challenges,
- participation in development and use of voluntary consensus standards for public health and safety, and
- leadership in securing action on behalf of environmental and public health goals.



Past recipients of the *Walter F. Snyder Award* include:

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2013 - Vincent J. Radke	2002 - Gayle J. Smith	1992 - Robert Galvan	1982 - Emil T. Chanlett
2012 - Harry E. Grenawitzke	2001 - Robert W. Powitz	1991 - Trenton G. Davis	1981 - Charles H. Gillham
2011 - Gary P. Noonan	2000 - Friedrich K. Kaferstein	1990 - Harvey F. Collins	1980 - Ray B. Watts
2010 - James Balsamo, Jr.	1999 - Khalil H. Mancy	1989 - Boyd T. Marsh	1979 - John G. Todd
2009 - Terrance B. Gratton	1998 - Chris J. Wiant	1988 - Mark D. Hollis	1978 - Larry J. Gordon
2008 - CAPT. Craig A. Shepherd	1997 - J. Roy Hickman	1987 - George A. Kupfer	1977 - Charles C. Johnson, Jr.
2007 - Wilfried Kreisel	1996 - Robert M. Brown	1986 - Albert H. Brunwasser	1975 - Charles L. Senn
2006 - Arthur L. Banks	1995 - Leonard F. Rice	1985 - William G. Walter	1974 - James J. Jump
2005 - John B. Conway	1994 - Nelson E. Fabian	1984 - William Nix Anderson	1973 - William A. Broadway
			1972 - Ralph C. Pickard
			1971 - Callis A. Atkins



The 2015 Walter F. Snyder Award will be presented during NEHA's 79th Annual Educational Conference (AEC) & Exhibition to be held in Orlando, Florida, July 13 - 15, 2015.

For more information or to download nomination forms, please visit www.nsf.org or www.neha.org or contact Stan Hazan at NSF at 734-769-5105 or hazan@nsf.org.



79th NEHA
AEC

JULY 13-15, 2015

79th National Environmental Health Association (NEHA)
Annual Educational Conference (AEC) & Exhibition
Orlando, FL

IMAGINE THE NEW NEHA



REGISTER NOW

	Member	Nonmember
Early Full Conference Registration Includes admission for one person to the Networking Luncheon, Exhibition Grand Opening & Party, and Presidents Banquet.	\$575	\$735
Early Retired/Student Registration Does not include any food functions. Tickets must be purchased separately.	\$155	\$230
Early One-Day Registration Does not include any food functions. Tickets must be purchased separately.	\$310	\$365

Registration information is available at neha2015aec.org. For personal assistance, contact customer service toll free at 866.956.2258 (303.756.9090 local), extension 0.

PRE-CONFERENCE COURSES AND EXAMS

Schedule is subject to change.

Advance your expertise and career potential by obtaining a NEHA credential or certification at the AEC. You may choose to take just a credential/certification course, just an exam, or both a course and an exam.
Note: Only qualified applicants will be able to sit for an exam.

Visit neha.org/credential for details on each exam or pearsonvue.com/neha for alternate test options.

Certified Professional – Food Safety (CP-FS)

Saturday & Sunday, July 11 and 12, 8 am – 5 pm

This two-day refresher course is designed to enhance your preparation for the NEHA CP-FS credential exam. Participants are expected to have prior food safety knowledge and training equal to the eligibility requirements to sit for the CP-FS exam. The course will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

Cost: \$325 for members and \$425 for nonmembers. Includes the CP-FS Study Package (CP-FS manual, NEHA's Professional Food Manager book, and the 2009 and 2013 FDA Food Codes on CD), a \$235 value.

Exam: Monday, July 13, 8 – 10:30 am

Separate application and exam fee required. \$245 member/\$390 nonmember. Deadline to apply to take the exam is May 29, 2015.

Certified in Comprehensive Food Safety (CCFS)

Friday & Saturday, July 10 and 11, 8 am – 5 pm
Sunday, July 12, 8 am – 12 pm

NEHA is pleased to offer the course for the CCFS credential at the 2015 AEC. The CCFS is a strong core credential for food safety professionals with a primary concern of overseeing the producing, processing, and manufacturing environments of the U.S. food supply. It has been designed to meet the increasing need for highly qualified food safety professionals from both industry and the regulatory community that provide oversight in preventing food safety breaches at U.S. production and manufacturing facilities and abroad. The credential course will cover exam content areas as described in the job task analysis. The course will utilize different learning modalities from critical thinking exercises to small group breakouts and videos.

Cost: \$375 for members and \$475 for nonmembers. Includes NEHA's CCFS Preparation Guide.

Exam: Monday, July 13, 8 – 10:30 am

Separate application and exam fee required. \$245 member/\$390 nonmember. Deadline to apply to take the exam is May 29, 2015.

Registered Environmental Health Specialist/ Registered Sanitarian (REHS/RS)

Friday & Saturday, July 10 and 11, 8 am – 5 pm
Sunday, July 12, 8 am – 12 pm

This two and a half day refresher course is designed to enhance your preparation for the NEHA REHS/RS credential exam. Participants are expected to have a solid foundation of environmental health knowledge and training equal to the eligibility requirements to sit for the REHS/RS credential exam. This course alone is not enough to pass the REHS/RS credential exam. The class will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

Cost: \$499 for members and \$599 for nonmembers. Includes the REHS/RS Study Guide, a \$179 value.

Exam: Sunday, July 12, 1 – 6 pm

Separate application and exam fee required. \$265 member/\$450 nonmember. Deadline to apply to take the exam is May 29, 2015.

HACCP—Managing Hazards at the Retail Level

Sunday, July 12, 8 am – 5 pm

The course is designed to teach the requirements needed for HACCP team/staff and to provide managers, regulators, and frontline food safety personnel in retail food facilities with an understanding of how behavior and active participation in creating, implementing, and maintaining a HACCP plan can greatly impact the likelihood for success. Special emphasis is placed on the process HACCP approach.

Managing Hazards at the Retail Level is offered and certified by NEHA; the course is further accredited by the International HACCP Alliance.

Cost (course and exam): \$249 for members and \$299 for nonmembers.

Exam: Monday, July 13, 8 – 10 am

KEYNOTE SPEAKER

Meet NEHA's New Executive Director

The AEC Keynote is the perfect place to hear from NEHA's new executive director! While at the time of this printing we're unable to disclose the name, you will not want to miss this opportunity to hear firsthand from NEHA's new leader. Our path forward means engaging players from different and perhaps unrelated disciplines to environmental health. It means finding the route to succeed in an increasingly crowded and competitive world. It means having global reach and global influence. Join our executive director in imagining and shaping the new NEHA!

BE INSPIRED!

In a world where environmental health professionals are often unsung heroes, the AEC is the ideal time and place to recognize and congratulate your peers for their contributions. With almost two dozen awards given, hear the inspirational stories and learn about the people in the honored spotlight.

NEW FOR 2015!

We are adding a brand new networking opportunity, the Award Winners' Circle! This will be a place where attendees can connect and chat with the award winners recognized at the AEC. Be inspired and hear directly from these outstanding professionals who were nominated by their environmental health peers.



NETWORKING

Strengthen your business and personal relationships and build a network of colleagues that you can call on at anytime!

ANNUAL UL EVENT

Join us as we welcome attendees to Orlando with the ever popular UL Event. You're invited to the Hard Rock Café at Universal's City Walk where you'll be treated to a red carpet entrance, cocktails, and appetizers in the John Lennon Room. This private room within the world's largest Hard Rock Cafe is an ideal way to network with one another in one of the city's premier VIP venues. You'll also have plenty of time afterwards to enjoy a night on the town visiting the other City Walk hot spots.

The UL Event is not included in the registration pricing for the AEC.
Visit neha2015aec.org for pricing and registration details.



CONNECT

Lunch in Exhibition

This year we've combined the Exhibition and a concession lunch so that you have more chances to network with one another and with our fabulous AEC exhibitors.

More Ways for You to Connect

- Community Event on Sunday, details coming soon!
- Networking Luncheon on Monday, sponsored by American Public University
- Exhibition on Monday and Tuesday
- Breakfast & Town Hall Assembly and Presidents Banquet on Wednesday

JOIN US FOR THE COMMUNITY EVENT!

Kick off the conference on Sunday afternoon by joining us to volunteer with the Clean the World Foundation. It was such a worthwhile activity last year in Las Vegas, and we're fortunate that our conference is held in Orlando where Clean the World has a second facility. Visit neha2015aec.org for details and to sign up!



PRELIMINARY SCHEDULE

Friday, July 10

Review Courses: REHS/RS, CCFS

Saturday, July 11

Review Courses:
REHS/RS, CP-FS, CCFS

Sunday, July 12

Review Courses: REHS/RS, CP-FS,
CCFS, HACCP

Exam: REHS/RS (afternoon)

Events:

- Community Event
- First Time Attendee Workshop
- Annual UL Event

Monday, July 13

Exams: CP-FS, CCFS, HACCP

Events:

- Education Sessions
- Networking Luncheon
- Keynote Presentation
- Awards Presentations
- Award Winners' Circle
- Exhibition Grand Opening
& Party

Tuesday, July 14

Events:

- Education Sessions
- Exhibition
- Lunch in Exhibition
- Student Research Presentations
- Poster Session

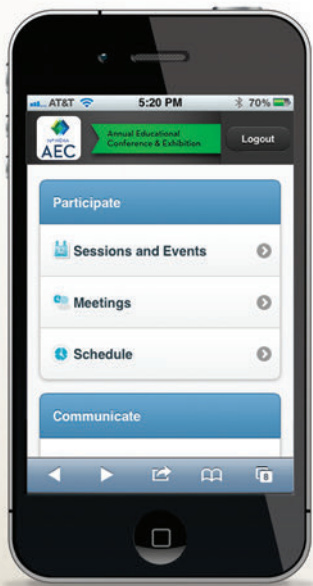
Wednesday, July 15

Events:

- Breakfast & Town Hall
Assembly
- Education Sessions
- Field Trips
- Presidents Banquet

Schedule is subject to change.

YOUR AEC MEETING COMPANION



Download the AEC App
from Google Play or iTunes

Enhance your learning experience whether you attend the AEC or participate online from your home or office.

- **Stay connected and informed:** View interactive maps, session descriptions, speakers, exhibitors, and attendee profiles. Get the latest AEC news and announcements via live social feeds sent directly to you.
- **Create your customized conference schedule:** Add sessions and events you want to attend to your schedule. Then, export the schedule to your Outlook or other electronic calendar.
- **Network and converse:** “Meet” other attendees, speakers, and exhibitors via the chat forums. Request meeting connections, swap digital business cards, or connect digitally with others in your area of specialty or geographic region.
- **Learn:** Use the chat feature to ask questions, post comments, and communicate with speakers and other attendees. Discover the latest innovative products and services shared by AEC exhibitors.

Your Continuing Education Resource

After the conference, you can still access the educational sessions, view presentation slides, and obtain supplemental materials through the continuing education resource.

NEW SESSIONS!

GAIN A FRESH
PERSPECTIVE
AND BE
INSPIRED



Tools for Success Today and Making a Difference for Tomorrow!

We've stepped up our game from last year and not only are we bringing you sessions that demonstrate innovations in approaches, partnerships, research, and technology, but we're adding sessions that include evidence-based practices with proven track records.

Food Safety & Defense

- Thinking Inside the Box—Using Cartoons to Imagineer Food Defense
- Using FDA's Risk Factor Study to Enhance Retail Food Safety Effectiveness
- In a Nut Shell—Need to Know Food Allergen Info
- Verification Times Two: How Do Food Managers Verify Food Safety
- Chemical-Free Cleaning and Sanitizing in Retail Food Establishments
- Merging Public Health and Food Safety Awareness Using a Mobile Application

Emergency Preparedness & Response

- Fire, Security, and Emergency Management Challenges for NASA's Space Program
- New Role for Environmental Health in Emergency Management
- Environmental Health Training in Emergency Response (EHTER): Building Capacity Through Blended Learning
- Health, Safety, and Security During an Outbreak of Ebola Virus Disease
- Volunteer Engagement Within the Emergency Management Cycle

Sustainability & Solid Waste

- Conserving the Magic: Creating a Culture of Environmentality™
- Are Steam Autoclaves or Incinerators the Only Way of Treating Medical Waste?
- E-waste, E-toxics, E-pressing
- Innovation: A New Approach to Addressing "Recycling" Sites

Health Impact Assessment

- How to Build Capacity for Health Impact Assessment With Little or Nothing
- Reducing Environmental Health Disparities Through Adult Education

Leadership

- "Doing More With Less" Is an Oxymoron (and It's Not Realistic!)
- Changing Your Organization's Direction: Key Steps in Charting a Successful Course
- Achieving Excellence in a Time of Austerity
- Pursuing Public Health Accreditation With Support From Environmental Public Health Programs
- What Is Environmental Public Health: Recruiting High School Students into the Profession

Onsite Wastewater

- Hybrid Adsorption and Biological Treatment Systems (HABiTs) for Onsite Wastewater Treatment
- Power to the People: How Environmental Health Professionals Can Help Communities Help Themselves
- Everyone Deserves a Decent Throne: EH Lessons From Sierra Leone, India, and Haiti
- Onsite Wastewater Treatment System Nitrogen Contributions to Water Resources in North Carolina

Recreational Water

- Demonstration of Knowledge: Making a Real Difference to Safety
- Act on the MAHC
- Swimming Pool Regulations: Both Sides of the Cyanuric Acid Stabilizer Debate
- Geared Towards Compliance: Using Evidence-Informed Strategies to Train Pool and Spa Operators

Climate Change

- Join the Discussion: The Importance of Locally-Specific Climate Change-Related Health Outcome Tools
- An Evaluation of the Heat Relief Network Cooling Centers in Maricopa County
- Adaptation in Action

Technology & EH

- Navigating the Seas of Technology: Computer-Based Training for an International Cruise Line
- Telemetry and Remote Monitoring in Food Safety
- Regulatory Efficiency and Customer Service: Florida Plan Review Centralization and Electronic Initiatives
- Conquering Time and Space: Effectively Using Weather Data to Assess Environmental Health
- What's Trending? Today's Technology and Tomorrow's Solutions

Vector Control

- Rabies by the Numbers: A Mapping Application to Make Data More Accessible
- Appalachian Mountain Innovative Readiness Training
- Prevention of Zoonotic Infection in Children by *Baylisascaris procyonis*
- Biting Back: Vector Control Program Performance Assessment and Improvement Projects

Water Quality

- Identification and Implementation of Effective Educational Campaigns for Private Well Testing
- What's in Your Drinking Water? A Domestic Well Water Sampling Program
- The Drinking Water Treatment Partnership Project
- Viruses in Groundwater Drinking Water Sources

This is just the tip of the iceberg with the NEHA AEC providing more than 150 presentations exclusively dedicated to the environmental health profession.

See our Web site for complete information and for other tracks including Children's EH, Environmental Justice, General EH, Schools, and Healthy Homes.

FIELD TRIPS

Since we are visiting one of the country's—arguably the world's—largest travel destinations, we want to explore how some of these attractions handle the environmental health impacts of millions of visitors. Plan to attend one of these hands-on field trips in Orlando.

Sustainability

Tour a biogas facility to see how bacteria convert food and other organic waste into electricity that powers a theme park.

Recreational Water

Go behind the scenes at a water park to see how the equipment, operations, and maintenance of a summer vacation destination can support a healthy swimming environment.

Onsite Wastewater

Visit the Florida Onsite Wastewater Association's one-of-a-kind training center, featuring various above-ground systems and components.

***Field trips are tentative and may require an additional registration cost.**

Space is limited, so register early.

A WISE INVESTMENT

for You and Your Organization

- Gain the skills, knowledge, and expertise needed to build capacity for environmental health activities.
- Help solve your environmental health organization's daily and strategic challenges and make recommendations to help improve your bottom-line results.
- Learn from speakers that are environmental health subject matter experts, industry leaders, and peers that share common challenges.
- Earn continuing education (CE) credit to maintain your professional credential(s).
- Receive a return on investment (ROI) with both immediate and long-term benefits.

See For Yourself

Visit neha2015aec.org/about for ROI and other information about the NEHA AEC.

Continuing Education Hours

Attendees of the 2015 AEC can earn up to 24 hours of continuing education for their NEHA credential.

NEHA has been recognized as a provider of relevant continuing education and recertification credits for these organizations:

- Florida Department of Health Registered Sanitarian
- Florida Department of Health Certified Environmental Health Professionals
- California Registered Environmental Health Specialist

NEW TO THE NEHA AEC?

Check out our video from last year's conference using the *E-Journal* to get a peek of what it's all about!

Or, you can view the video at neha2015aec.org/about.



ORLANDO

So Much to Explore!



NEHA AEC DESIGNATED HOTEL

Renaissance Orlando at SeaWorld

Room rate: \$129 per night + taxes.

AEC attendees will not have to pay the hotel's resort or Internet fees.

For more information, visit neha2015aec.org/hotel.

With dozens of theme parks and attractions, world-class golf courses, and miles of ocean and gulf beaches a short drive away, you will want to plan an extended stay in Orlando before or after (or both!) the conference. Cool off at a water park, visit an orange grove, take an airboat ride, or drive a NASCAR race car!

- SeaWorld Orlando
- Disney's Magic Kingdom, Animal Kingdom, Hollywood Studios, Epcot
- Kennedy Space Center and Visitor Complex
- Discovery Cove
- Legoland
- Universal Studios Florida including the Wizarding World of Harry Potter
- Richard Petty Driving Experience
- Busch Gardens Tampa
- Gatorland and Wild Florida Gator Park

GO AHEAD GIVE IN

VISIT THE ORLANDO
ATTRACTIONS YOU'VE
ALWAYS WANTED TO SEE!



NEHA NEWS

NEHA Staff Profile

As part of tradition, NEHA features new staff members in the *Journal* around the time of their one-year anniversary. These profiles give you an opportunity to get to know the NEHA staff better and to learn more about the great programs and activities going on in your association. Contact information for all NEHA staff can be found on page 47.

**Eileen Neison**

Hello, my name is Eileen and I am the new customer service representative in the credentialing department. I am the person you can call or e-mail if you have any questions or problems relating to your NEHA credential or continuing education hours.

I am a Colorado native, and I received my bachelor's degree at Metropolitan State College in Denver. My double major was in history and English. All of my prior work experience has had a strong customer service component. I worked for 17 years in bookstores (12 of those years at the world-famous Tattered Cover Bookstore), then as a real estate agent, and most recently as a relationship manager at a financial services company. I am thrilled to be working for a nonprofit organization. I have had a strong interest in environmental health from an early age, being concerned with recycling and preserving our natural resources.

It is extremely rewarding to be working in a support position to all of NEHA's environmental health and food safety professionals. When I worked in the financial services industry, customers would call up and scream at me because the value of their mutual funds had gone down. Now when people call up, it is a genuine pleasure to instead be helping people who help keep all of us and our planet safe. Our members are really nice people who work

hard and are only noticed when something goes wrong. The whole environmental health field is such a broad subject area. I can't wait to read each new *Journal of Environmental Health* as it comes out, and learn something new and fascinating.

NEHA Supports National Healthy Schools Day

National Healthy Schools Day (NHSD) is April 7, 2015. NEHA is pleased to partner again with the Healthy Schools Network (www.healthyschools.org) in supporting and promoting this event. NEHA has been a supporter since 2011. NHSD is a national partnership campaign for indoor air quality in schools coordinated by the Healthy Schools Network with involvement from the U.S. Environmental Protection Agency (U.S. EPA), other federal agencies, and numerous organizations.

The Healthy Schools Network is the leading national voice for children's environmental health in schools and is an award-winning 501c3 nonprofit environmental health organization. Founded in 1995, the network launched the national healthy schools movement with comprehensive state policy recommendations and a model coalition. It has since fostered reform coalitions in many states and localities.

NHSD promotes the use of U.S. EPA's IAQ Tools for Schools guidance (www.epa.gov/iaq/schools/index.html) as well as other U.S. EPA environmental health guidelines and programs for schools and children's health.

NEHA's thousands of environmental health professionals recognize children's environmental health as being one of its core priority areas. NEHA's work in the area of school food safety and indoor air quality in schools reflects that concern. NEHA is proud to again join its colleagues in offering its strong support of this year's NHSD.

For more information about NHSD, please visit www.national-healthyschoolsday.org. 🐛

NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION



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People's homes are their havens. As a **Healthy Homes Specialist (HHS)** you understand the connection between health and housing, enabling you to take a holistic approach to identify and resolve problems such as radon, lead, and pests that threaten the health and well-being of residents. Developed in partnership with the National Center for Healthy Housing.

Learn more at neha.org/credential/hhs.html





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*College Board: Trends in College Pricing, 2013.

We want you to make an informed decision about the university that's right for you. For more about our graduation rates, the median debt of students who completed each program, and other important information, visit www.apu.edu/disclosure.

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ONLINE PROGRAMS
USNews
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2015

QUESTIONS?

HOW
DOES THE MAHC
APPLY?

**IS THIS
HOOD**
APPROPRIATE
FOR THIS COOKING
EQUIPMENT?

WHERE DO I
FIND INFORMATION ABOUT
DRINKING WATER
ADDITIVES?

WHICH STANDARDS
APPLY TO
FOOD CARTS?

WHAT
IS THE PROCESS
FOR FIELD EVALUATION
OF **EQUIPMENT?**

HOW DO I STAY
AHEAD OF
EMERGING PATHOGEN
ISSUES?

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